

The Republic of Congo's Infrastructure

A Continental Perspective

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Abstract

Infrastructure contributed half a percentage point to the Republic of Congo's annual per capita GDP growth from 2001 to 2006. If the country's infrastructure were improved to the level seen in Mauritius, the regional leader, it could contribute more than 3 percentage points to annual per capita growth.

The Republic of Congo's existing infrastructure is concentrated in the developed south, reflecting the country's urbanization patterns. Links spread from there to the less-developed north, where there are vast areas of underexploited dense forest.

The Republic of Congo's power sector offers the greatest potential for infrastructure-based economic growth, but major inefficiencies need to be addressed. Transit improvements would also make significant contributions to growth by improving connections to the north and to

neighboring countries. Additional opportunities include rehabilitating the fixed-line telephone operator to spread Internet access. The country's water and sanitation infrastructure is in relatively good shape.

Spending on infrastructure was \$460 million per year in the Republic of Congo during the mid-2000s. Based on these spending levels, if all inefficiencies were eliminated, the country would face an infrastructure funding gap of \$270 million a year and would not meet infrastructure targets for 31 years.

Spending rose to \$550 million per year in 2008–09. If the Republic of Congo could maintain these higher spending levels, the funding gap would essentially disappear. The nation could further reduce the funding gap by adopting lower-cost technologies to meet infrastructure targets.

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The Republic of Congo's Infrastructure: A Continental Perspective

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Synopsis

Upgrading infrastructure plays a critical role in the Republic of Congo's quest to diversify its economy and reduce poverty. It is also an important source of growth on its own. A cross-country statistical analysis conducted for this report shows that infrastructure contributed one-half of one percentage point to the Republic of Congo's per capita GDP growth annually from 2001 to 2006. However, if the country's infrastructure could be improved to the level seen in Mauritius, the leading country in Sub-Saharan Africa, it could contribute more than 3 percentage points to annual per capita growth.

The Republic of Congo's power infrastructure is inadequate and inefficiently operated. The country lags well behind peer countries in generation capacity and electrification. The parts of the population not served by the grid face exorbitant costs. The government has responded to these issues with an ambitious investment plan. However, if new assets are to operate effectively, major inefficiencies in the power utility will also need to be addressed. The utility's transmission and distribution losses are 47 percent, more than double best-practice benchmarks, while the cost of overstaffing is 30 percent of utility revenue. Tariffs recover barely half the cost of service provision, even though full cost recovery would be affordable to the population.

In the ICT sector, the Republic of Congo has made good progress in developing its mobile telephony market in recent years, with high levels of signal coverage. The cost of international connectivity is currently high, but it should fall once the country connects to the international submarine cable and completes its domestic fiber optic network. On the other hand, the physically dilapidated and financially depleted condition of the fixed-line telephone operator is becoming a constraint to raising Internet penetration.

Restoring the national transport network will require major investment and careful policy decisions in the port, road, rail, and river transport sectors. Following the approval of the National Transport Plan, major road sector investments are underway to restore connections between Pointe-Noire, Brazzaville, and the north of the country. A road fund has also been established to provide for maintenance, although so far resources have not been adequate. Significant performance improvements are needed at the Pointe-Noire port and on the CFCO rail link if the competitiveness of that corridor is to be restored. Constructing a bridge linking Brazzaville to Kinshasa would help to increase traffic through Pointe-Noire and improve overall route viability. Improving navigability on the Congo-Oubangui-Sangha rivers would also help to restore a highly cost-effective transport mode of strategic significance to the north of the country.

The Republic of Congo performs relatively well on service coverage in the water and sanitation sector. The country's access statistics are substantially ahead of those in its peer group, particularly with regard to piped water, standposts, and improved latrines. However, access to services is much greater in urban areas than in rural areas. Furthermore, underpricing of water has hurt the financial soundness of the water utility, even though analysis suggests that cost recovery tariffs would be affordable to consumers.

The Republic of Congo needs to spend \$0.95 billion per year through 2015 to catch up on infrastructure quantity and quality. This is equivalent to 16 percent of GDP, comparable to the share

China devoted to infrastructure during the mid-2000s. By far the largest spending needs are in the power sector, where spending of \$0.5 billion per year is required. By comparison, transport, water, and sanitation each require an estimated \$0.2 billion per year. While most of the needs relate to capital investment, as much as a quarter of this sum is needed to address operations and maintenance requirements.

Spending on infrastructure was \$0.46 billion per year during the mid-2000s. That figure rose to \$0.55 billion per year in 2008–09. More than half of existing spending goes to the transport sector. The bulk is financed from domestic sources. Contributions from external financiers are relatively small; most significant is official finance from donors outside the Organisation for Economic Co-operation and Development (\$44 million a year), followed by official development assistance (ODA) from OECD members (\$19 million a year). Compared with other resource-rich countries in Africa, the Republic of Congo captures little private finance for infrastructure.

There is an “efficiency gap” of \$0.32 billion per year across infrastructure sectors. These resources are in the system but, due to inefficiencies, are not spent productively. Challenges include service underpricing (\$78 million per year), operational inefficiencies of utilities (\$79 million per year), and underexecution of capital budgets (\$52 million per year). In all three cases, the power sector is by far the greatest culprit. Furthermore, \$112 million per year is spent in certain sectors that could be reallocated more productively elsewhere.

If all inefficiencies were eliminated, the Republic of Congo would face an infrastructure funding gap of \$0.27 billion a year, or approximately 4.7 percent of GDP. Shortfalls in power and water investment account for most of that total. No gap was found for transport. The funding gap was calculated based on spending levels of the mid-2000s. If the higher spending levels of 2008–09 could be sustained, the gap would essentially disappear.

By adopting lower-cost technologies to meet infrastructure targets, the Republic of Congo could reduce its annual funding gap by \$158 million. On the other hand, without regional power trade, power sector costs would be \$272 million higher.

If the Republic of Congo is unable to sustain spending at the levels of the recent past, capture efficiency gains, and reduce costs through suitable technology choices, and instead continues to spend at the levels of the mid-2000s, the country will take 78 years to achieve its infrastructure targets. By capturing efficiency gains and maintaining spending at the level of the mid-2000s, it could meet the infrastructure targets within 31 years.

The continental perspective

The Africa Infrastructure Country Diagnostic (AICD) has conducted extensive data collection and analysis of the infrastructure situation in most Sub-Saharan countries, including the Republic of Congo. The results have been presented in a variety of continental reports on different areas of infrastructure—ICT, irrigation, power, transport, water, and sanitation—and different policy areas, including investment needs, fiscal costs, and sector performance.

This country report provides an overview of the key AICD findings for the Republic of Congo so that the country's infrastructure situation may be benchmarked against that of African peers—particularly other resource-rich countries.

Due to the cross country nature of the data collection, a time lag is inevitable. The AICD covers the years 2004–07. Most technical data presented are for 2006 (or the most recent year available), while financial data are typically averaged over the available period to smooth out the effect of short term fluctuations. In addition, the report standardizes the indicators and analysis to ensure consistency and allow for comparisons across countries. For these reasons, some of the indicators may be slightly different from those that are routinely reported and discussed at the country level.

Why infrastructure matters

The infrastructure sector contributed half a percentage point to the Republic of Congo's annual per capita growth over the past decade—considerably lower than the regional average of 0.99 percentage points. Growth in the Republic of Congo was generated primarily by increased access to mobile telephony, while the inadequacy of the power supply held back the economy.

Infrastructure's historically small contribution to growth suggests that the Republic of Congo can achieve significant gains from improvements in these sectors. Simulations suggest that if the country's infrastructure platform were improved to the level of the African leader—Mauritius—annual per capita growth rates could increase by 3.7 percentage points. This compares with an average of 2.92 percentage points for the continent as a whole (figure 1).

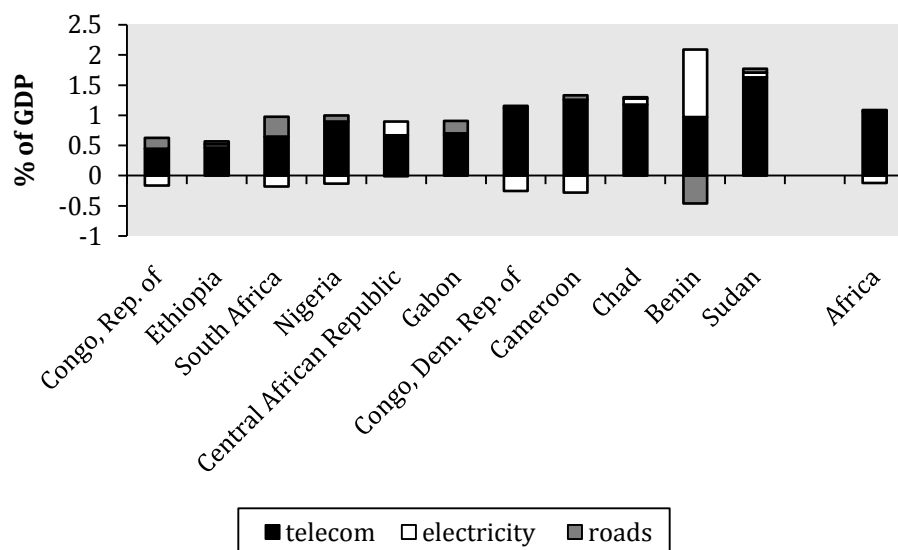
Most of the potential contribution to growth would come from improvements in the power sector, particularly through increases in generation capacity. Evidence from a 2009 World Bank/IFC enterprise survey¹ suggests that power is by far the greatest infrastructure constraint for Congolese firms. Surveyed firms report losing up to 16 percent of sales due to frequent power outages—almost triple the average of 6 percent for Sub-Saharan Africa.

Road improvements would also make a significant contribution to growth. For example, the cost of importing to the north of the country would fall from \$313 per ton via Douala to \$267 per ton via Pointe-Noire if road connections were used; and the development of feeder roads in the areas of Pool and Cuvettes, where land has high agricultural potential, could bring returns of around 34 percent (Briceño-Garmendia and Foster 2009).

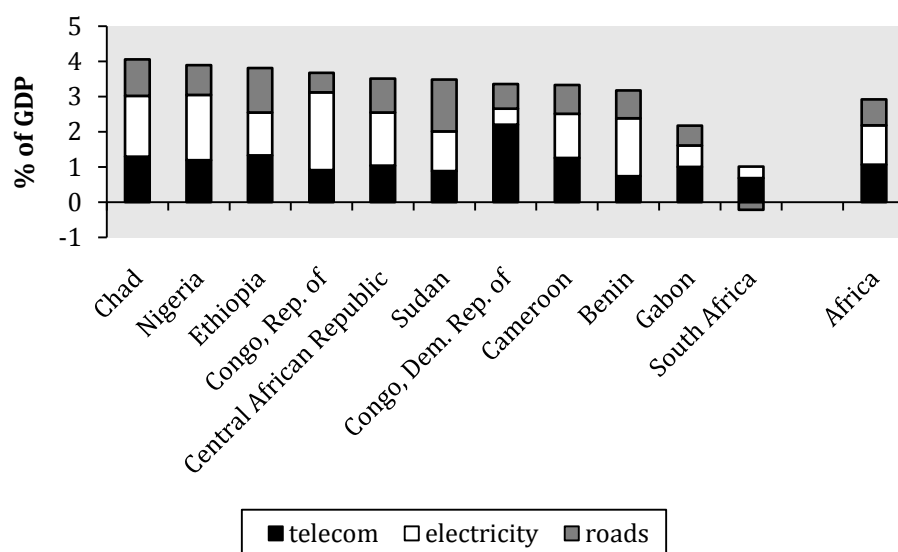
¹ <http://www.enterprisesurveys.org/ExploreEconomies/?economyid=49&year=2009>

Figure 1. Infrastructure has not contributed much to Congo's growth—it could contribute much more

a. Contribution of infrastructure to annual growth per capita, 2001–5 versus 1991–5, %



b. Potential improvements in growth per capita if infrastructure were improved to level of Mauritius, %



Source: Calderon 2008.

The infrastructure network has the potential to interconnect with the networks of neighboring countries. The power network is already closely linked with that of the Democratic Republic of Congo. In the transport sector, a road corridor—functional but in poor overall condition—links Brazzaville and Pointe-Noire and extends to the borders of Gabon to the west, Cameroon and Central Africa to the far north, and Angola and the Democratic Republic of Congo to the south and southeast. The Republic of Congo also has important rail and river corridors.

This report begins by reviewing the main achievements and challenges in each of the Republic of Congo's major infrastructure sectors, with the key findings summarized below (table 1). Thereafter, attention will turn to the problem of how to finance Kenya's outstanding infrastructure needs.

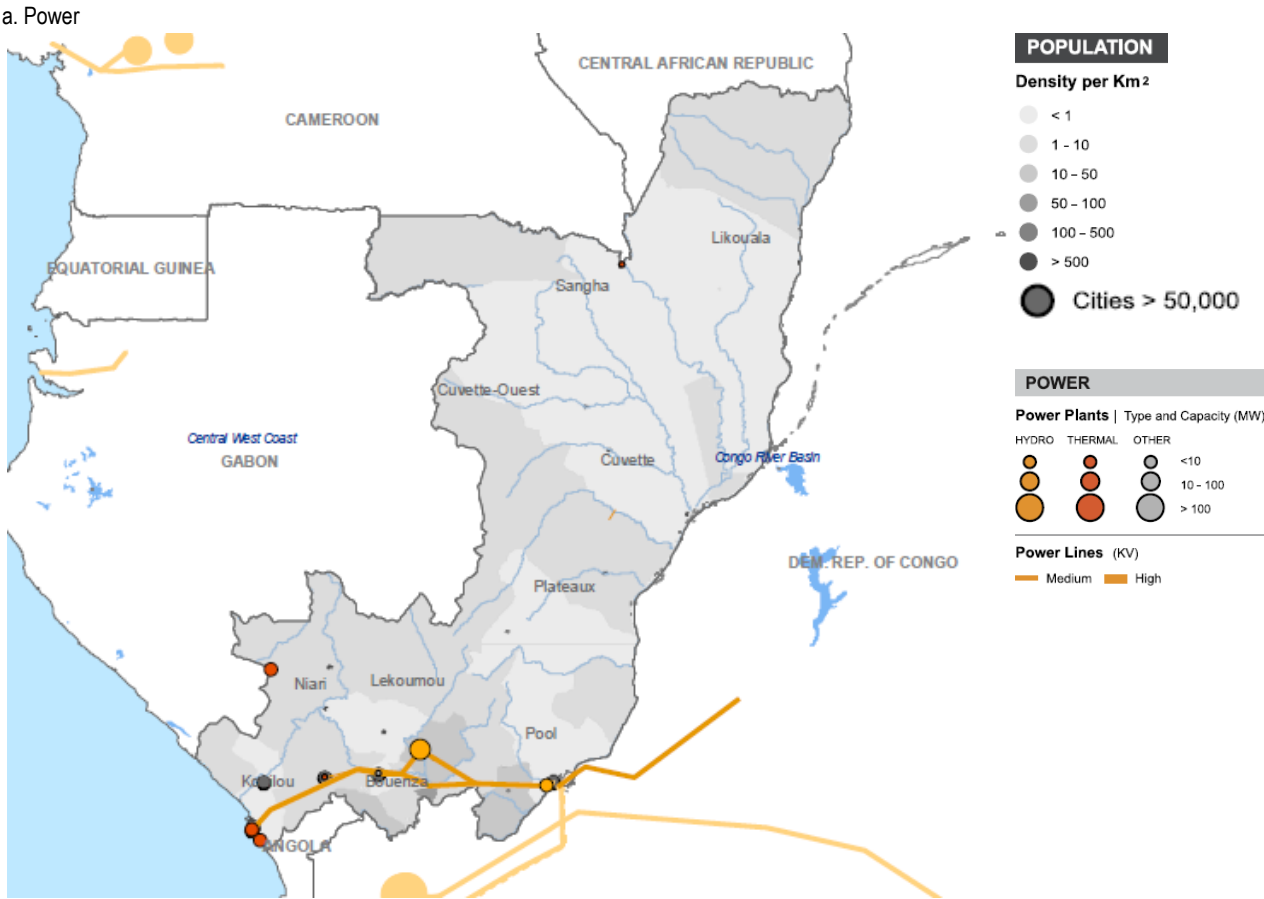
Table 1. Achievements and challenges in Congo's key economic infrastructure sectors

	Achievements	Challenges
Power	Rapid expansion of generation capacity (300MW thermal and 120 MW hydro) National power grid is planned Rehabilitation of 425 km HV transmission line from Pointe-Noire to Brazzaville Prices close to cost recovery	Finance huge investment program Provide enough transmission and distribution capacity to transfer available power to consumers Reduce frequent power outages Increase access to electricity, particularly in rural areas Decrease transmission and distribution losses
ICT	Two-thirds of population covered by GSM Mobile penetration on par with comparator countries Some competition in the mobile sector	Restructure Congo Telecom (SOTELCO) and open to private participation Improve broadband quality Lower prices
Surface transport (roads and rails)	Maintenance funding is steadily increasing Sound investment program is underway	Improve trunk road network Create effective rural roads network Transition of the road fund to fully functional second generation fund Railway service is slow, unreliable, unsafe, and expensive Ensure efficient road and rail connectivity between Brazzaville-Pointe-Noire and Brazzaville-Kinshasa
Maritime and river transport	One of the best ports in Sub-Saharan Africa Developing a national port master plan The Congo River is a cost-effective transport artery for northern timber	Modernize, expand, and increase regional competitiveness of the port of Pointe-Noire Dredge tributaries of the Congo River to facilitate domestic timber production
Water and sanitation	Large proportion of people with access to piped water	Reduce use of open surface water Increase access to improved water sources in rural areas Address utility inefficiencies, particularly underpricing

The state of Congo's infrastructure

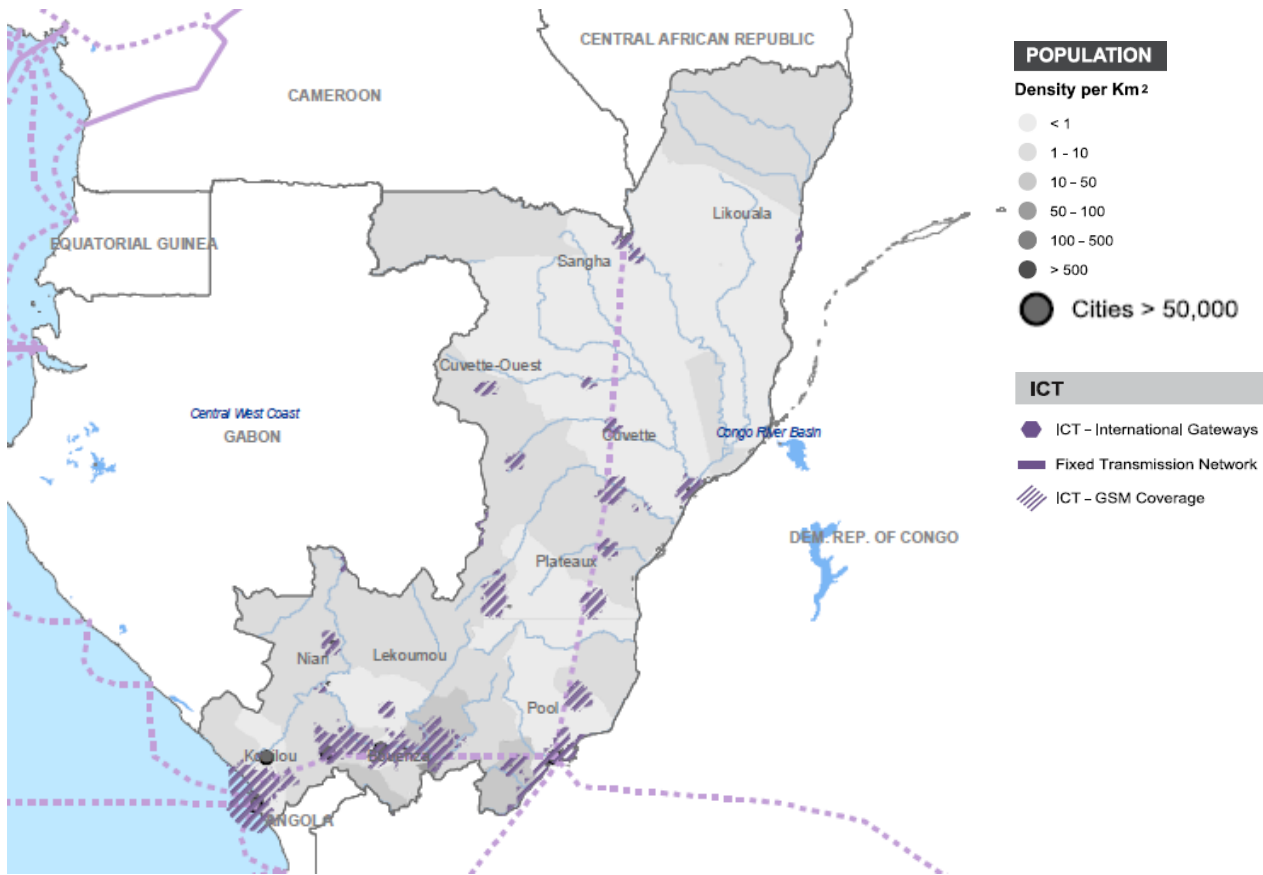
The Republic of Congo's infrastructure backbones have tended to follow the country's urbanization patterns. They cover the southwest region and spread upward from there, with the least developed links in the northeast (figure 2). This reflects the fact that the Republic of Congo is a predominantly urban country. The biggest cities are clustered in the south and southwest around the oil fields and known mining resources, with 61 percent of the population living in two urban areas: the capital, Brazzaville, in the southeast, and the major port, Pointe-Noire, in the southwest. The country's vast areas of dense forest are heavily exploited in the southwest, but are still underexploited in the northern part of country.

Figure 2. Congo's infrastructure networks have followed urbanization patterns



THE REPUBLIC OF CONGO'S INFRASTRUCTURE: A CONTINENTAL PERSPECTIVE

b. ICT

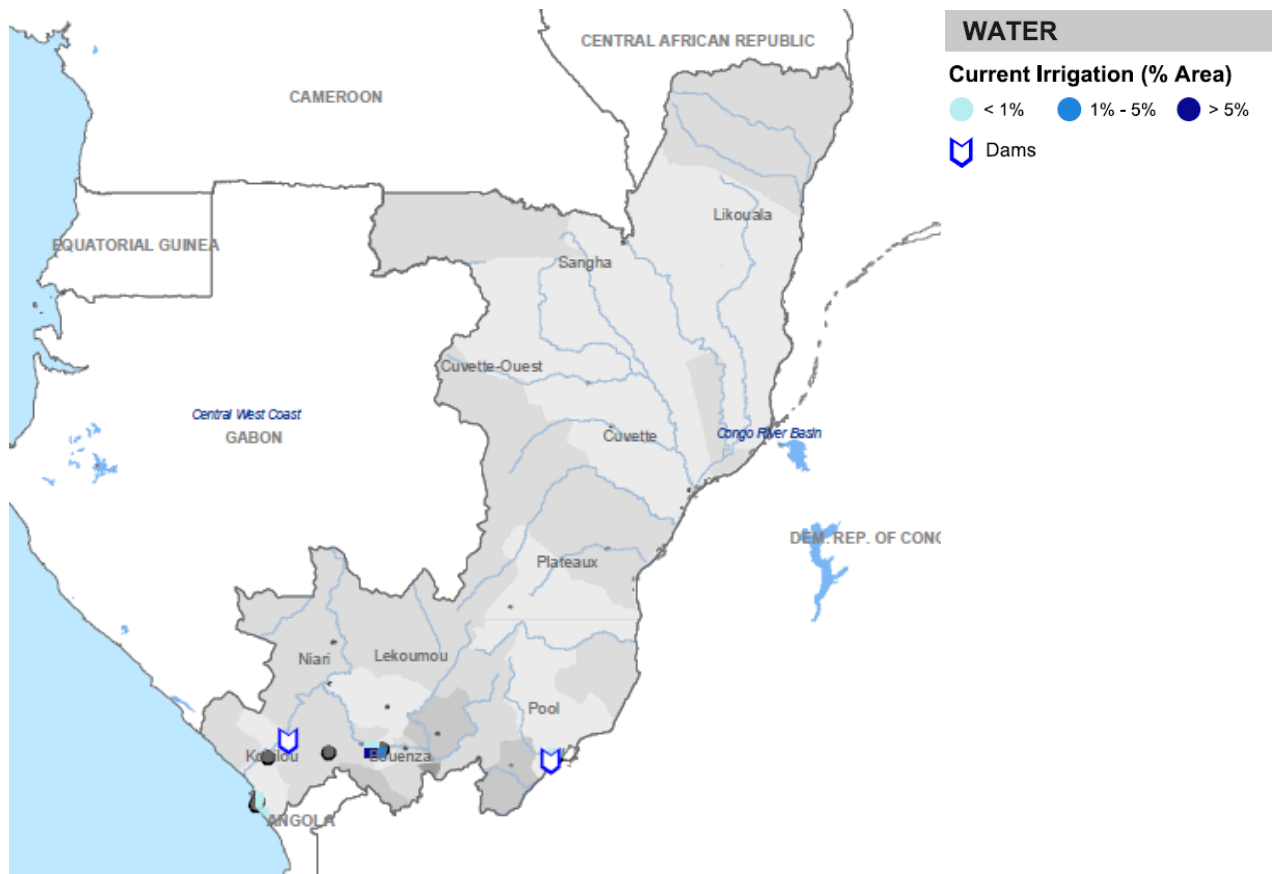


THE REPUBLIC OF CONGO'S INFRASTRUCTURE: A CONTINENTAL PERSPECTIVE

c. Transport



d. Water



Power

Achievements

The government has ambitious plans to double access to electricity by 2011. Efforts are underway to upgrade generation and transmission capacity to reach this goal. The country currently has a generation capacity of around 361 MW: the hydroelectric plants in Moukoulou and Djoué provide 74 MW and 15 MW, respectively, the gas powered thermal plant in Brazzaville provides 32 MW, the newly commissioned gas fired plant at Pointe Noire with a capacity of 150 MW and the Imboulou hydroelectric power station currently produces 90 MW. The capacity of Imboulou hydroelectric dam located 215 km north of Brazzaville, being built by a Chinese company will be increased to 120 MW through the commissioning of the fourth unit later this year. The capacity of the gas fired power plant in Pointe-Noire will be doubled to 300 MW in 2011. The long-term marginal cost of developing this generation capacity is around \$0.08 per kilowatt hour. Transmission improvements are also planned. In particular, the transmission line from Pointe-Noire to Brazzaville will be rehabilitated and extended northward in the direction of Ouando (550 km from the capital).

Challenges

The Republic of Congo's power sector is underdeveloped in terms of generation capacity, power consumption, access, and reliability. Though the country no longer depends on imports from the Democratic Republic of Congo, the power supply is unreliable. Frequent outages have forced firms and households to accumulate a stock of self generation capacity of 207 MW. The stock of self generation capacity represents nearly 60% of the capacity of the national system. Access to electricity is well below the average for African peers in both urban and rural areas, but the situation is particularly dire in rural areas—rural access to electricity is only 16.74 percent (table 2). Households in the top two income quintiles in rural areas spend less than 0.2 percent of their budget on electricity due to lack of access (figure 5). Instead, they are forced to substitute less clean alternatives for fuel. Despite the low quality of service, power tariffs of \$0.09–0.15 per kilowatt hour are among the highest in Africa predominantly hydro systems (figure 4).

In addition to the network's limited coverage and reliability, reforms will have to address inefficiencies, which create significant hidden costs and drive power tariffs up (figure 3). The national power utility, Société Nationale d'Electricité (SNE), is the main source of inefficiencies in the sector. Transmission and distribution losses are 47 percent of power generated, which is high compared to the average of 27 percent for other resource-rich African countries. The associated financial losses are equivalent to 37 percent of SNE's revenue. This is likely due to lack of maintenance and rehabilitation of the existing distribution network and a permissive policy regarding illegal connections. Overstaffing is also high relative to other African power utilities. Finally, the utility only collects 88 percent of billings. These significant hidden costs hamper SNE's ability to recover costs and therefore limit investment in rehabilitation and system expansion. Existing tariffs—though high by any continental standards—are enough to pay for operating costs, but if investment needs are considered, cost recovery is only 53 percent.

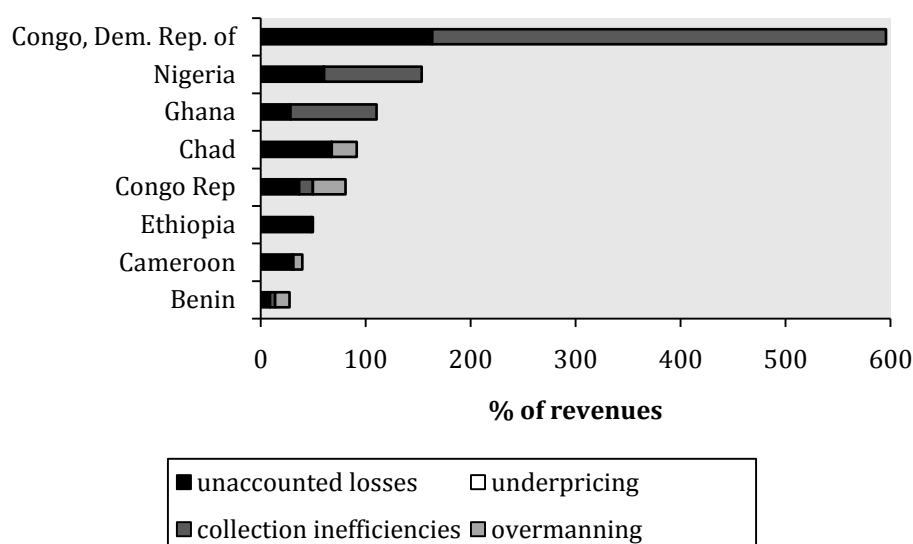
Table 2. Benchmarking power infrastructure and capacity, access, and utility performance

	Unit	Republic of Congo	Resource-rich countries
Installed power generation capacity	MW/mil. people	-85.6	42.2
Power generation	kWh/capita	250	200.2
Power outages	# in a typical month	27.4	15.8
Firms' value lost due to power outages	% sales	15.7	7.2
Access to electricity	% population	34.9	46.1
Urban access to electricity	% population	51.3	78.7
Rural access to electricity	% population	16.4	27.6
Revenue collection	% billings	91.0	77.5
Distribution losses	% production	47.4	26.5
Operational cost recovery	% cost	112	77.7
Cost recovery		53	55.9
Total hidden costs	% revenue	86.1	83.6
Tariff (US cents per kWh)	Congo	Predominantly hydro generation	Other developing countries
Power tariff (residential at 100 kWh)	15.0	10.27	5.0-10.0
Power tariff (commercial at 900 kWh)	10.0	11.73	
Power tariff (industrial at 50,000 kWh)	9.9	11.39	

Source: Eberhard and others 2008.

Only the south of the country has access to grid electricity from SNE, while the north has to rely on costly off-grid generation. As a result, the effective price of power is three times higher in the North. For example, all forest concessionaires in the north (and some in the south) are too remote to benefit from grid electricity and must rely on diesel powered own generation facilities for onsite timber processing. The cost of diesel generation is estimated to be \$0.23 per kilowatt hour for the concessionaires in the south, where diesel is less expensive due to proximity of Pointe-Noire; but it is \$0.62 per kilowatt-hour—nearly three times higher—for the northern concessionaires. By comparison, the long-term marginal cost of grid electricity is \$0.08 per kilowatt hour, and this would fall to \$0.06 per kilowatt hour if the country had the necessary infrastructure to import power from Cameroon.

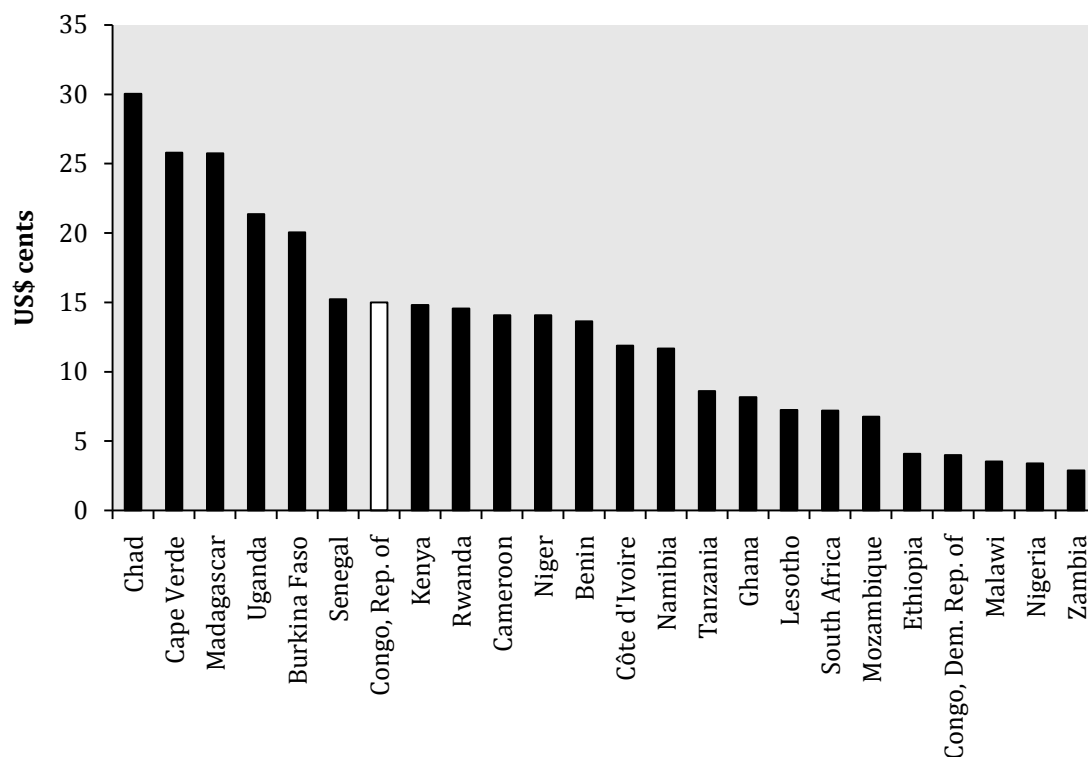
Figure 3. Hidden costs of power utilities



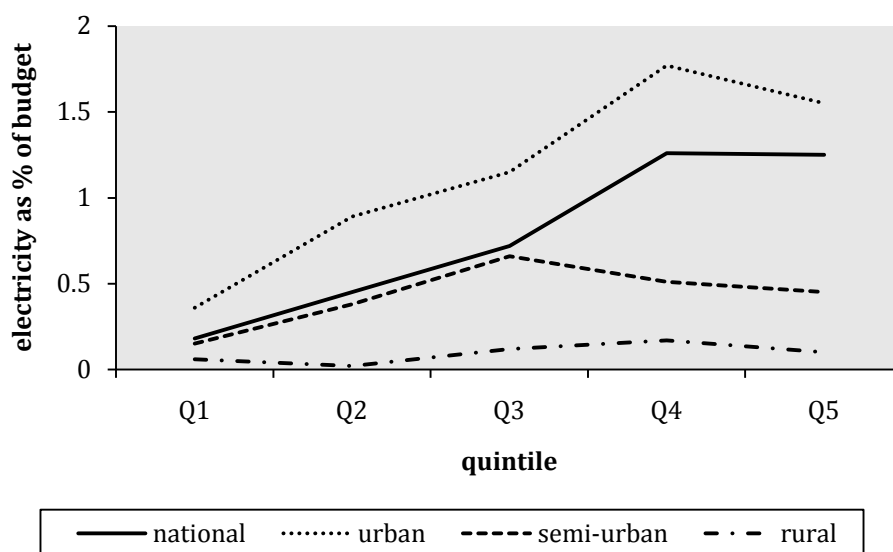
Source: Briceño-Garmendia and others 2008.

Figure 4. Congo's electricity tariffs are relatively high

Effective residential tariff at 100 kWh



Source: Briceño-Garmendia and others 2008.

Figure 5. Household budget shares for electricity, 2005

Source: IMF 2009.

Information and communication technology

Achievements

Competition has increased in the Republic of Congo's mobile market in recent years. As a result, about 70 percent of the country's population is covered by a GSM signal, compared with 48 percent for resource-rich African countries (table 3). Mobile telephony penetration is also higher in the Republic of Congo—35 percent compared with the 24 percent resource-rich benchmark. Furthermore, the subscriber base grew by 8.2 percent of the population from 2006–08 compared with 1.7 percent in the typical African country. In 2003 there were 330,000 subscribers, and by the end of 2007, this had risen to an estimated 760,000 served by three key mobile operators: Zain, MTN, and Warid Telecom (box 1). The three main existing operators (Zain Bharti Airtel, MTN Congo and Warid) entered the market between 1997 and 2007. A fourth operator entered the market in 2010. The progression of the Herfindahl-Hirschman Index (HHI Index) during the last decade reflects the market structure's dynamism (figure 6).

The Republic of Congo has committed to undertaking several transformational ICT projects. First, the *projet couverture nationale* is intended to extend broadband access to remote areas and get closer to broadband universal access. The country also intends to connect to the West Africa fiber optic cable system through the Project West Africa System Cable (WACS, discussed below). And finally, it will implement an effective connectivity strategy and use the connectivity to increase government efficiency as part of the World Bank financed Project CAB CITCG —Central African Backbone.

The Republic of Congo recently signed an agreement to connect to the submarine cable through the WACS (West Africa Cable System) Project, which is a planned submarine communications cable linking South Africa with the United Kingdom along the west coast of Africa. The landing station in the Republic of Congo will provide the country with its first direct connection to the global submarine cable network.

In 2008–09, the GoC designed and adopted a new Policy and Strategic Vision for the ICT sector (Cyberstrategy), a road map ushering Congo to the next stage of ICT connectivity, with the goal of becoming a regional ICT hub. In 2009, the Republic of Congo adopted an important legal and policy framework for regulation of the postal and telecommunication sectors. It is expected to expand the use of new technologies in the sector.

Table 3. Benchmarking ICT infrastructure

	Unit	Republic of Congo		Resource-rich countries
GSM coverage	% population	75.0		47.7
Interment bandwidth	Mbps/capita	0.29		2.7
Internet	subscribers/100 people	0.03		0.3
Landline	subscribers/100 people	0.41		1.1
Mobile phone	subscribers/100 people	35.4		23.7
Prices (US\$)	Republic of Congo	Without submarine cable	With submarine cable	Other developing regions
Price of monthly mobile basket	18.8	11.1	13.6	9.9
Price of monthly fixed line basket	—	13.6	16.7	—
Price of 20-hour Internet package	84.5	68.0	47.3	11.0
Price of a 3-minute call to United States	5.4	2.6	1.4	2.0
Price of inter-Africa telephone calls, mean	—	0.72	0.44	n.a.

Source: Ampah and others 2009.
— = data not available; n.a. = not applicable

Box 1. Congo's mobile operators

Zain

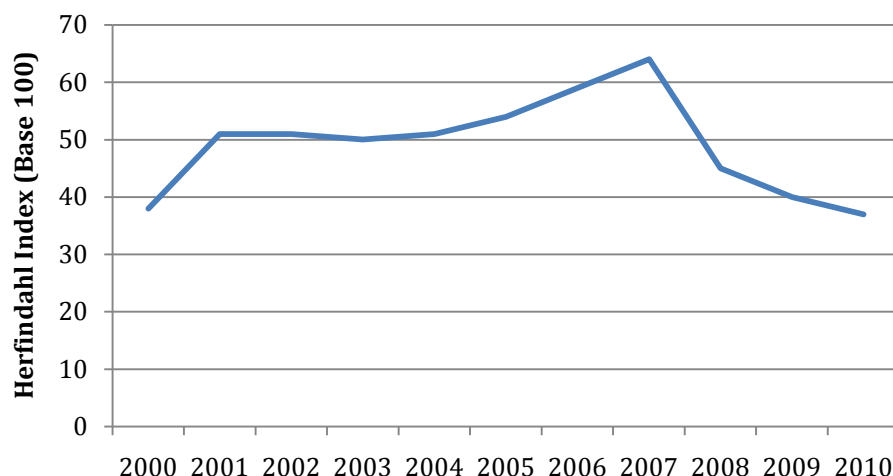
Zain launched services as Celtel in December 1999 and was rebranded in 2008. The company's subscriber base grew from 43,000 in December 2000 to 116,000 by December 2001 and 165,000 by December 2002. By 2007, Zain had reached 1,014,000 subscribers.

MTN

Originally a Telecel subsidiary, the company that is now MTN was bought by Orascom, which rebranded it Libertis in May 2000 and sold it outright to MTN in 2005. The Libertis subscriber base grew from 22,600 in 2000 to 47,635 in September 2001, 73,438 in September 2002, and 76,544 by December 2002. When MTN bought the company, it recorded 210,000 subscribers in December 2005, which represented a 35 percent market share. By December 2007, this figure had grown to 330,000. ARPUs remained constant at \$20 for both 2006 and 2007.

Warid Telecom

In 2006, Warid Telecom announced that it would form a joint venture with incumbent Congo Telecom (SOTELCO). The government licensed it to offer both voice and data services. It launched in January 2008 and said it would invest \$95 million over five years.

Figure 6. Evolution in the Herfindahl-Hirschman Index between 2000 and 2010

Source: Wireless Intelligence 2010.

Challenges

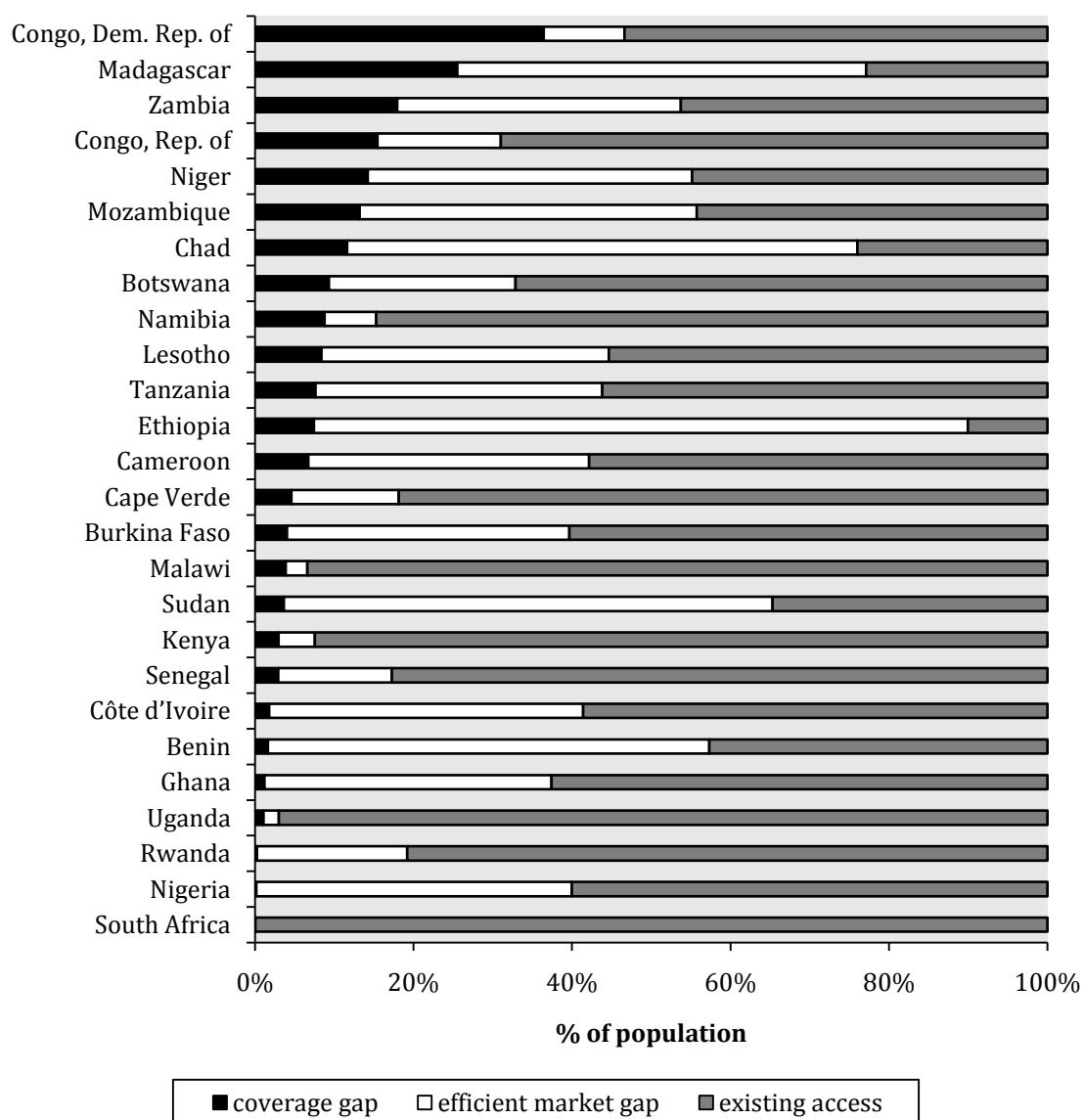
Most of the telecommunications network, including the national microwave transmission backbone, was destroyed during the war. All but one telephone exchange at Pointe-Noire were damaged. Since then, Congo Telecom has undertaken a limited infrastructure rehabilitation program. Most of the backbone is using wireless connections through 32 Mbps Microwave links. The Republic of Congo currently has three active mobile companies. As indicated above, GSM population coverage is already approximately 70 percent. Based on consumers' purchasing power and willingness to pay for mobile services, it is estimated that the private sector could make sufficient investments in the coming year to cover an additional 15 percent of the population on a commercially viable basis (figure 7). To achieve universal access, however, subsidies will be required to provide coverage to the remaining 15 percent of the population.

The cost of international connectivity is high in the Republic of Congo. A mobile call to Washington, DC, costs an estimated \$0.96 (Celtel), compared with \$0.40 a minute (Celtel and Vodacom) from Democratic Republic of Congo. Broadband and international calls are also more expensive than in the rest of Africa, and Internet access is slower, at 0.3 mpbs compared with 2.7 mpbs for the resource-rich benchmark. However, once the country is connected to the submarine cable, these figures should improve. In other African countries that have connected to the submarine cable, prices have been cut in half as long as access to the international gateway is competitively provided.

In contrast with the mobile sector, fixed telephony remains in the hands of the public monopoly, Congo Telecom (formerly Société des Télécommunications du Congo, or SOTELCO). The government has said it intends to privatize Congo Telecom, but this is unlikely given its shaky financial state. In mid-2007, the company announced it had suspended payment of salaries to avoid a financial meltdown.

Overstaffed and faced with falling revenue, the company faces bankruptcy unless it can create and implement a turnaround plan.

Figure 7. Telecommunications coverage and the efficient market gap



Source: Mayer and others 2009.

Fixed line density in the Republic of Congo is low and declining. Coverage was 0.41 subscribers per 100 people in 2005, less than half of the resource-rich benchmark. That figure dropped to 0.35 subscribers per 100 people in 2007 from 0.24 in 2008. Moreover, the quality of the fixed line network is rapidly deteriorating, and it is becoming a constraint to expanding and improving Internet services. Much of the telecommunications network—including the national microwave transmission backbone and telephone exchanges in Brazzaville—was destroyed in fighting. Not surprisingly, costs are high. The price of a three

minute phone call to the United States through the fixed line network is \$5.40, twice as high as in regional peer countries (table 3).

Poor availability, high costs and slow speeds for installation of fixed line services have obstructed the market for internet access in RoC. At the end of 2009, there were only 15,000 internet subscribers in the country, the bulk of which connected via GPRS (General Packet Radio Service) networks (source ARPCE). ADSL (Asymmetric Digital Subscriber Line) connections in May 2010 totaled just 121, of which only eleven had access to downlink speeds of 512kbps, the highest rate recorded at the time. The number of broadband subscribers was estimated to reach 130 in September 2010, according to Teleography.com, and RoC's eGovernment Readiness Index has fallen over time (from 0.2855 in 2005 to 0.2737 in 2008).

Political will and institutional strengthening will be required for success in the implementation of the new legal and regulatory framework, new ICT projects, and the submarine cable agreement. Under the Heavily Indebted Poor Countries process in which the Republic of Congo was engaged from 2006 to January 2010, the trigger for the floating completion point was the adoption of a regulatory framework for the telecommunications sector that established competition in international gateways and the wireless local loop. Two actions were undertaken to meet the HIPC requirement: first, the repeal of a 2004 decree that restored the monopoly on international gateways and granted exclusivity in the wireless local loop market to Congo Telecom, the incumbent operator; and second, the adoption of new legislation to set up an independent telecommunications regulatory authority (ARPCE) and ensure clear and transparent regulatory regimes, particularly in frequency management.

Table 3. Benchmarking Congo's road infrastructure

	Unit	Republic of Congo	Resource- rich countries	Sub- Saharan Africa
Paved road density	km/1000 km ² of arable land	25	111	101
Unpaved road density	km/1000 km ² of arable land	11	287	340
GIS rural accessibility	% of rural pop within 2 km from regional and national roads	34	21	23
Paved road traffic	Average Annual Daily Traffic, cars per day	850	1,570	1,201
Unpaved road traffic	Average Annual Daily Traffic, cars per day	50	56	54
Paved network condition	% in good or fair condition	38	67	79
Unpaved network condition	% in good or fair condition	21	62	59

Source: Gwilliam and others 2008.

Surface transport

Achievements

The Republic of Congo recognizes surface transport as a development priority. The government has therefore allocated significant resources for its improvement. Because its development potential is so high, building up transport corridors is a critical element of the country's Poverty Reduction Strategy Paper (PRSP). Better infrastructure in the transport corridors could stimulate growth in transport and logistics services, especially if the Republic of Congo could once again become a transit country for Central Africa. In addition, infrastructural improvement is a prerequisite for the development of productive activities in other sectors, particularly agriculture.

Box 2. Congo's road fund

The Republic of Congo's road fund (RF) was established in 2005 to ensure the financing of: (i) regular and periodic maintenance of the primary road network, including urban, national and rural roads; (ii) rehabilitation of the road network; (iii) road security; (iv) protection of national road assets; and (v) conducting studies and technical support related to the aforementioned areas.

The RF is administered by a Permanent Secretariat, which is overseen by an Executive Committee (*Comité de Direction*). However, the involvement and control of the Ministry of Public works limits the autonomy of the RF. The Roads Directorate in the Ministry of Public Works is responsible for programming of road maintenance and rehabilitation activities. The Directorate is also responsible for supervising the work once it is underway through its provincial offices, although it often hires private firms to do so instead.

More than 40 percent of funding for the RF is provided by direct transfers from the general budget. Only 20 percent is provided directly from user charges. A further 12 percent comes from taxes and royalties on commercial forestry activities. While the direct transfer from the general budget is essential to reach a minimum level of funding for road maintenance, it is the main factor preventing the RF from operating as a second generation road fund. It also makes funding unpredictable, since commitment of such budgetary resources depends on general budget preparation and execution decisions. Furthermore, although taxes and fees are regularly collected, their proceeds are not necessarily transferred to the RF. Since the beginning of its operation in 2005, and with the exception of 2008, the RF has received only about 60 percent of the resources collected on its behalf by the Treasury.

While the funding levels of the RF have expanded considerably since its inception in 2004, they are not sufficient to ensure a regular and proper upkeep of the country's priority road network. As a result, maintenance and rehabilitation projects are continually postponed, creating a significant backlog. Moreover, about half of the RF resources are used for rehabilitation, leaving only half for pure maintenance activities.

Improving the effectiveness of the RF will likely entail two measures. First, funding that passes must be automatically transferred to the RF. Second, RF resources should be focused on maintenance, with rehabilitation left to the government budget.

To help realize the country's development potential in surface transport, several initiatives have been launched. A national transport plan (Plan National de Transport, or PNT), adopted in 2004, covers new investments and rehabilitation over a 15-year horizon for all types of transport and with a multi-modal perspective. A trunk road investment program is also underway to improve basic regional and national connectivity and link the capital to the coast, international border crossings, and provincial capitals. Most notable is the new highway between Brazzaville and Pointe-Noire, which should be operational shortly after 2012. To secure funding for road maintenance and rehabilitation, a road fund was introduced in 2005 (box 2). There are a number of issues with the road fund's design, and since traffic volume is very limited, the fund may remain heavily dependent on general budget subsidies. Finally, there is renewed

interest in improving the management of the country's rail operator, CFCO, by partnering with the private sector. In 2005, an attempt to introduce private management through a concession agreement failed, mainly due to the inability to address the social and infrastructure costs of such a transaction.

Challenges

Prior to 1980, the Republic of Congo handled trade traffic to and from Central African Republic, the Democratic Republic of Congo, and Gabon. The country's key internal corridors—Pointe-Noire-Brazzaville by road and rail, Brazzaville-Ouesso by road, and Brazzaville-Sangha-Oubangui by river—linked major cities and the main national port and facilitated the flow of goods and services between major economic centers in the region. Trade with Gabon collapsed after that country developed its own railway system (Transgabonais) during the mid-1980s and Congo lost the mineral transit traffic from Gabon. Also, large part of transit traffic from the Democratic Republic of Congo was diverted to the port of Matadi on the Congo River and other international corridors. This situation persists: the north of the country is now served by Cameroon's port of Douala for both imports and exports, mostly due to the non-navigability of inland rivers (see below). Some 100,000 tons of imports to Brazzaville go by sea from Pointe-Noire to Matadi before being reimported overland via Kinshasa instead of being transferred directly from Pointe-Noire.

Road coverage in the Republic of Congo is limited. Paved road density over arable land is less than one-fourth of the resource-rich benchmark, and unpaved road density is less than 4 percent of the benchmark. Furthermore, roads are in poor condition due to years of neglect and conflict. Only 38 percent of the paved network and 21 percent of the unpaved network are in good or fair condition and ; the remaining unclassified road infrastructure is often inoperative (table 3). Although rural accessibility in Congo is higher than the benchmark for comparable countries (34 percent of the rural population lives within two kilometers of a regional or national road compared with 21 percent for the benchmark), this merely reflects the high concentration of population around urban areas and existing roads. The government is planning a major upgrading of the rural road network once the trunk network has been completed.

The country's rail network is among the worst in Africa in terms of service quality and safety (table 4). Rail traffic fell by two-thirds during the conflict (and service stopped altogether for some months) and has never returned to pre-conflict levels. CFO tariffs, at \$0.17 per ton/km, are also among the highest in Africa and up to three times as high as in southern Africa. The Republic of Congo's *Chemin de Fer Congo-Océan* (CFCO) rail corridor consists of a 510 kilometer main line linking Brazzaville to the Port of Pointe-Noire and a 285 kilometer branch to the north that has fallen into disuse due to the deteriorated condition of the line. Because of insufficient rehabilitation and maintenance of tracks, outdated and insufficient rolling stock, management deficits, and human resources limitations, the main line service is slow, unreliable, unsafe, and expensive.

Rehabilitating the CFCO and improving its performance is of strategic importance for the country's economy. The government plans to involve the private sector to mobilize additional financial resources and critical technical and managerial skills. Generally, rail concessions in Africa have improved operational performance and boosted traffic (Bullock 2009). But concessioning the CFCO has so far proven difficult for several reasons. First, the company has social debt and liabilities to the government

that need to be cleared. It also lacks a detailed inventory of its assets. Furthermore, given that the company is about to lose its monopoly on the Pointe Noire/Brazzaville corridor, it needs to develop a new tariff and commercial strategy that will strike a balance between its commercial and public service objectives under a transparent subsidy scheme to be paid for when it comes to passenger services by the Government. Finally, the company lacks a clear strategy to renew and upgrade its human resources although it has launched a recruiting plan for hundreds of employees and is embarked in a multiyear FCFA70 billion investment in track rehabilitation and rolling stock upgrade plan 100 percent financed by Government.

Table 4. Benchmarking Congo's rail infrastructure, 2010

Railway	CFCO	Camrail	SNCC	Transrail	Madarail	Sitarail
Country	Congo, Rep.	Cameroon	Congo, Dem. Rep.	Senegal & Mali	Madagascar	Côte d'Ivoire & Burkina Faso
Traffic volume, traffic units (millions)	354	1282	241	443	160	909
Traffic density, freight, 1000 ton-km/km	348	1161	66	344	236	721
Traffic density, passenger, 1000 passenger-km/km	260	420	10	35	9	—
Performance						
Staff: 1000 traffic units per Staff	168	571	19	278	164	692
Locomotive availability in %	—	86	22	55	81	93
Derailment frequency, traffic units/mainline derailment (millions)	—	26.0	0.8	2.2	1.3	101.0
Pricing						
Average unit tariff, freight, US cents/ton-km	17.0	8.9	21.5	7.2	5.8	6.7

Source: World Bank, Transport Unit of the Africa Department (AFTTR)

— = data not available.

Investments in the road and rail sectors will be more effective if packaged to support productive activities along existing “natural” corridors. As a recent infrastructure corridor analysis shows (Briceño-Garmendia and Foster 2009), multimodal integrated investment packages in such corridors are expected to yield a much higher return than the same investments conducted in isolation. Road corridor investments, for example, are projected to yield higher returns if combined with investments in feeder roads in areas of high agricultural potential for domestic markets, such as Sangha and Cuvette-Ouest in the north and Plateaux in the southeast. Furthermore, the rate of return on investments in river upgrading and feeder roads could double when accompanied by improvements to the downstream road and rail corridors. The corridor investment package with the highest return—a projected 24 percent—links Pointe-Noire to Brazzaville by rail and Brazzaville to Ouessou by river. The northern road corridor linking Brazzaville to its corresponding agricultural areas has a projected rate of return of 12 percent.

Surface transport investments must be planned and implemented in coordination with neighboring countries. For example, a road–rail bridge linking Brazzaville and Kinshasa would eliminate the need for transit traffic to cross the Congo River in barges, at an estimated cost of \$20 per tonne-kilometer. To put things in perspective, costs for rail transportation are estimated in US\$0.17 per tonne-kilometer and for roads about \$0.20-30 per tonne-kilometer .

Periodic maintenance is essential to avoid more expensive rehabilitation investments in the road network. A functional second generation road fund is an important step toward achieving this target. First, the road fund should fund maintenance, while rehabilitation should be financed directly from the budget and undertaken by a dedicated unit within the Ministry of Transport (DGGT). Second, user related charges should be adjusted to ensure sufficient maintenance funding. Third, the fund should be granted more autonomy in programming and supervising works.

Maritime and river transport

Achievements

The Republic of Congo's deep-water port of Pointe-Noire (*Port Autonome de Pointe-Noire, PAPN*) is one of the best natural ports in Africa. Largely spared the effects of the conflict, it is also the most competitive, investment attractive, and best maintained transport mode in the country. The port operates under a 27-year concession agreement that includes the expansion of port facilities signed by the French Bolloré Group and its local partners in 2008.

The Republic of Congo is one of only seven African countries with a national port master plan. The Port Authority, which developed the master plan, has secured private investment commitments of \$798 million to double the size of the port's 17 hectare container facility and double the annual throughput capacity of 300,000 TEUs within eight years. The port investment program also includes deepening the port to accommodate vessels up to 6,000 TEU, rehabilitating wharfs and warehouses, and constructing drainage and electricity supply networks and a timber yard.

The Congo River and its tributaries once provided a cost effective transport artery for timber from the Democratic Republic of Congo and the Central African Republic. However, due to lack of maintenance, and the effect of global warming, important parts of the fluvial system are unnavigable during several months of the year. In particular, the Sangha and Oubangui tributaries, which had served the Congolese forest concessions, can no longer fully support domestic production. Transit timber can still be floated down the main river to the capital, loaded into trains for transport to the coast, and exported. River barge transport was widely used during the colonial period and remains an inexpensive mode of transport at \$0.05 per tonne-kilometer. However, the river's unreliable navigability consumes much of the benefits brought by low costs.

Once the country's upriver road, rail, and river corridors are restored, the port of Pointe-Noire should be able to recapture significant transport traffic. Restoring the navigability of the Sangha and Oubangui rivers would make the port of Pointe-Noire competitive with Douala as a trading corridor for the northern part of the Republic of Congo. Similarly, upgrading the Pointe-Noire-Brazzaville road and rail connection would allow the port to capture export and import traffic from the Democratic Republic of Congo. In an optimistic scenario, the Republic of Congo could recapture all of its own imports (which are currently diverted through Matadi), half of imports to Kinshasa and Kisangani, and half of timber exports from the Democratic Republic of Congo. This could double the approximately one million tons of timber export traffic going through Pointe-Noire. As a result, the overall value of traded goods would double from \$3.3 to \$6.6 billion per year; transportation revenue would double from \$135 to \$278 million per year; and VAT revenue from the transport sector would double, albeit from a very low base. The impact on customs

revenue would be much smaller, since import duties are levied only on goods destined for the Republic of Congo and not on transit traffic.

Challenges

To realize the potential of the port of Pointe-Noire and river transport, the Republic of Congo faces several challenges. First, port performance, while typical of ports in Central Africa, leaves plenty of room for improvement on key efficiency parameters (table 5). In particular, competitive handling charges and administrative efficiency are essential, since Pointe-Noire faces similar distances and freight costs as ports in the Democratic Republic of Congo. This is more important for imports, for which administrative costs account for one-third of total costs; by comparison, administrative costs accounts for only 7 percent of export costs (Briceño-Garmendia and Foster 2009). Outside of Pointe-Noire, the Sangha and Oubangui tributaries of the Congo River need to be dredged if they are to become major transport corridors for domestic timber production. This will require investment of roughly \$30 million according to the national transport plan.

Table 5. Benchmarking the port of Pointe-Noire

Port	Luanda	Boma	Matadi	Pointe-Noire	Apapa	Cotonou	Tema
Country	Angola	Congo, Dem. Rep.	Congo, Dem. Rep.	Congo, Rep.	Nigeria	Benin	Ghana
Traffic							
Containers handled (TEU/year)	377,208	10,000	200,000	150,000	430,000	158,201	420,000
General cargo capacity (tons/year)	4,000,000	500,000	1,700,000	5,000,000	5,000,000	2,500,000	8,500,000
Handling charge (US\$/ton)							
General cargo	8.5	10	10	5.5	8	8.5	10
Dry bulk	5	—	8	2.8	—	5	3
Efficiency							
Container dwell time (days)	12	—	25	18	42	12	25
Truck processing time (hours)	14	—	18	12	6	6	8
Crane productivity (containers/hour)	7	6	10	6.5	28	—	39
Crane productivity (tons/hour)	16	5	6	7.5	9	15	13.5

— = data not available.

Air transport

Achievements

The Republic of Congo has a medium-sized domestic air market. Traffic is declining on the country's small international market. Connectivity is low, but seat capacity is high for routes served. In prewar times, the Republic of Congo was an important regional air hub. Due to the dilapidated condition of the country's road and rail network, air transportation continues to play an important role in both national and regional connectivity and transportation. The country has five national airports—Dolisie, Nkayi, Owando, Impfondo, and Ouessou—and several smaller airports. There are two international airports—Brazzaville and Pointe-Noire—and a third is under construction in Ollombo in the north. Several private operators

and the national operator Air Congo provide services. Regional destinations include Douala, Libreville, Cotonou, Abidjan, Lomé, Luanda, and Kinshasa.

Challenges

According to ICAO audit, the Republic of Congo's air transport safety is well below international standards. Safety in air transport would greatly improve if Congo's civil aviation authority were to acquire proper capacity to regulate the sector's security and safety. However, considering the small size of its aviation sector, gain in regulatory capacity will be hard to sustain and Congo might envisage teaming with larger civil aviation authorities such as Cameroun to maintain and/or improve its overall regulatory capacity in key areas such as aircraft and air crews licensing.

Water supply and sanitation

Achievements

The Republic of Congo compares favorably with other African countries in access to piped water: 26 percent of the population has access to piped water, compared with the regional average of 17 percent (table 6). But access is skewed to urban areas, with an access rate of 46 percent compared with rural access of only 11 percent. Two-thirds of the country's rural population (one-third of the total population) still uses surface water as its main water source (figure 8).

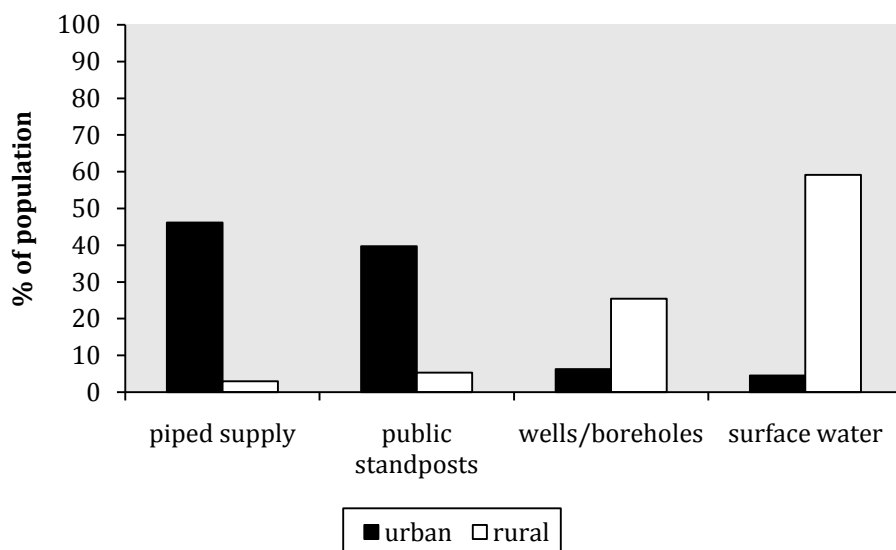
Table 6. Benchmarking access to water and sanitation and water utility performance

	Unit	Republic of Congo	Resource rich	Sub-Saharan Africa
Access to piped water*	% pop	25.8	12.8	16.6
Access to stand posts*	% pop	23.5	12.6	15.6
Access to wells/boreholes*	% pop	15.3	49.0	41.5
Access to surface water*	% pop	30.3	23.7	32.7
Flush toilets*	% pop	5.3	11.2	9.8
Improved latrines*	% pop	15.1	6.4	9.2
Traditional latrines*	% pop	69.8	54.8	52.4
Open defecation*	% pop	9.5	27.6	34.2
Domestic water consumption**	liter/capita/day	25	78.9	102.9
Collection ratio**	% sales	88.0	69.7	94.4
Distribution losses**	% production	45	43.9	33.4
Cost recovery of tariffs**	% total costs	51.6	59.3	44.2
Tariff (US cents per m3) **	Republic of Congo	Scarce water resources	Other developing regions	
Residential tariff (at 30 m3) **	48.6	60.26	3.0–60.0	
Non-residential tariff (at 100 m3/mo)**	48.6	120.74		

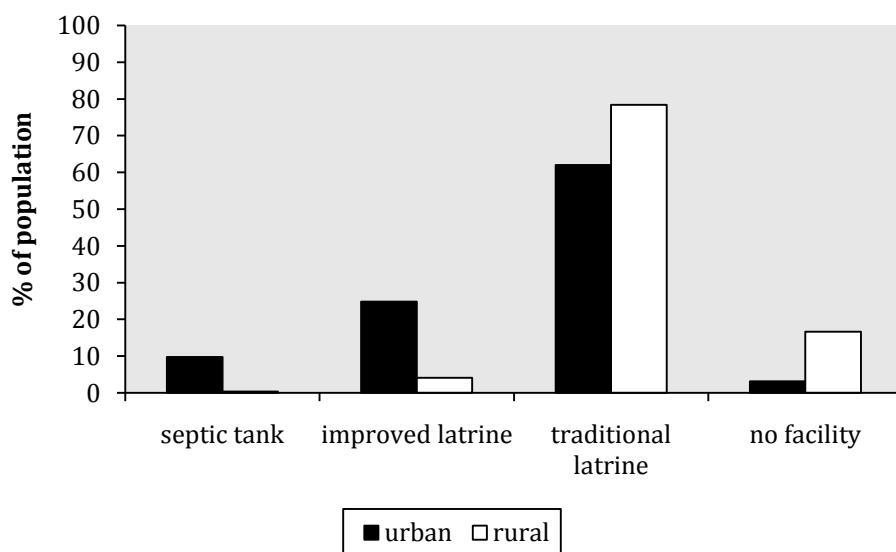
Sources: * Household survey, 2001; refers to national access. ** AICD database, 2005; refers only to SNDE.

Figure 8. Access to piped water and improved sanitation is higher in urban areas

a. Water



b. Sanitation



Source: Banerjee and others 2008.

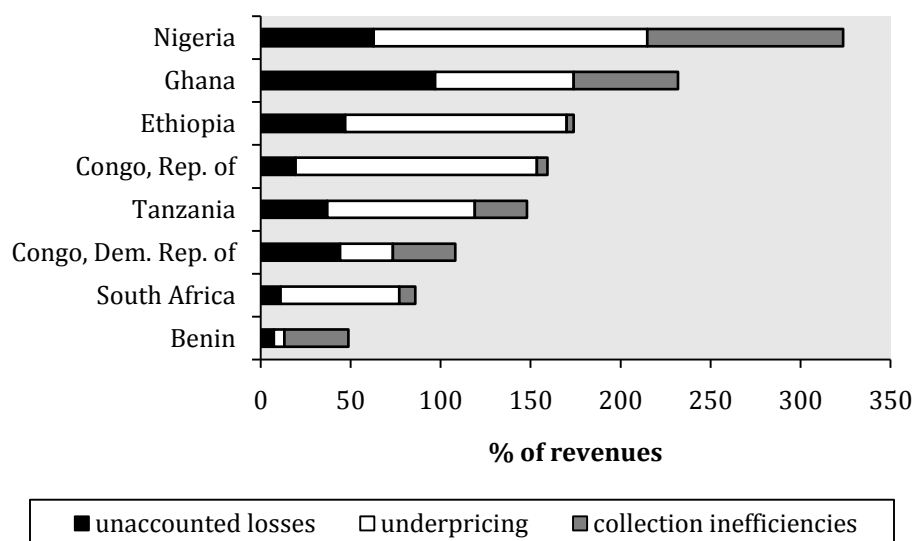
Challenges

The vast majority of the country's population still relies on unimproved sanitation services. Coverage of flush toilets is extremely low (5 percent in the Republic of Congo versus 11 percent in the benchmark group), and traditional latrines remain the main source of sanitation in both urban and rural areas. At the same time, the country has achieved good progress in reducing open defecation by increasing the use of traditional latrines. Only 10 percent of the population practices open defecation, compared with 28 percent for other resource-rich African countries.

Looking ahead, the country will need to reduce the large gap in access between rural and urban areas. Some of the recent success stories in Africa have resulted from the combination of reforms in the aforementioned areas.

Despite relatively high levels of access, the country's urban water utility, SNDE (Société Nationale de Distribution d'Eau), remains highly inefficient. The utility's inefficiencies create significant hidden costs for the utility equivalent to over 150 percent of revenue. SDNE barely captures 60 percent of the revenue that it needs to operate effectively. The main source of inefficiency is underpricing (figure 9). Water tariffs are \$0.49 per cubic meter, substantially lower than tariffs in other African countries with scarce water resources and make it possible to recover just about 52 percent of the utility's costs. Unaccounted losses and under collection of bills also contribute to the costs of inefficiencies but in much lesser extent. Distribution losses are relatively high—45 percent compared with 33.4 percent in other African resource-rich countries. The utility's collection ratio is also comparatively good at 88 percent, compared with 69.4 percent for other resource rich countries. Addressing inefficiencies will help to place the utility on a firmer financial footing, and thus place them in a better position to invest further in network expansion.

Figure 9. Hidden costs of Congo's water utilities are high



Source: Briceño-Garmendia and others 2008.

Financing the Republic of Congo's infrastructure

To meet its most pressing infrastructure needs and catch up with developing countries in other parts of the world, the Republic of Congo needs to expand its infrastructure assets in key areas (table 7). The targets outlined below are purely illustrative, but they represent a level of aspiration that is not unreasonable. Developed in a standardized way across African countries, they allow for cross-country comparisons of the affordability of meeting the targets, which can be modified or delayed as needed to achieve financial balance.

Table 7. Indicative infrastructure targets for Congo over the period 2005–15

	Economic target	Social target
ICT	Fiber optic links to neighboring capitals and submarine cables	GSM voice signal and public access broadband to 100% of the rural population.
Power	1,689 MW new generation 498 MW inter-connectors	Electricity coverage of 53% (84% within the urban areas)
Transport	National and regional connectivity by upgrading 1,052km of existing national roads, 1,318km of regional roads, and 305km of railways to good condition.	Rural road network needed to connect 80% of the total value of national agricultural output. This is equivalent to providing access to 48% of rural population. Place entire urban population within 500 meters of all-season road
Water and sanitation	not applicable	Achieving the MDG for water and sanitation: 85% population with improved water by 2015 and 60% of population with improved sanitation by 2015.

Meeting the country's infrastructure needs would cost \$946 million per year through 2015. Spending needs are highest in the power sector, which requires an estimated \$483 million per year to keep pace with demand by installing 1,689 MW of new hydropower capacity and 498 MW of new cross-border transmission each year. While small relative to the huge power financing needs, water and sanitation needs are also high at \$216 million per year, and transport financing needs are substantial at around \$163 million per year. Spending needs are comparatively modest in the ICT sector, where the private sector plays a pivotal role. Overall, capital expenditure accounts for 77 percent of spending requirements, with power accounting for \$438 million, or 60 percent of total capital needs (table 8). Operations and maintenance account for more than 40 percent of spending needs in the transport sector.

Table 8. Indicative infrastructure spending needs in Congo for 2005–15

Sector	US\$ million per year		
	Capital expenditure	Operation and maintenance	Total spending needs
ICT	40	44	84
Power	438	44	482
Transport	94	69	163
WSS	159	57	216
Total	731	215	946

Note: Figures refer to investment except public sector that also includes recurrent spending. Public sector covers general government and nonfinancial enterprises.

Source: Briceño-Garmendia and others 2008.

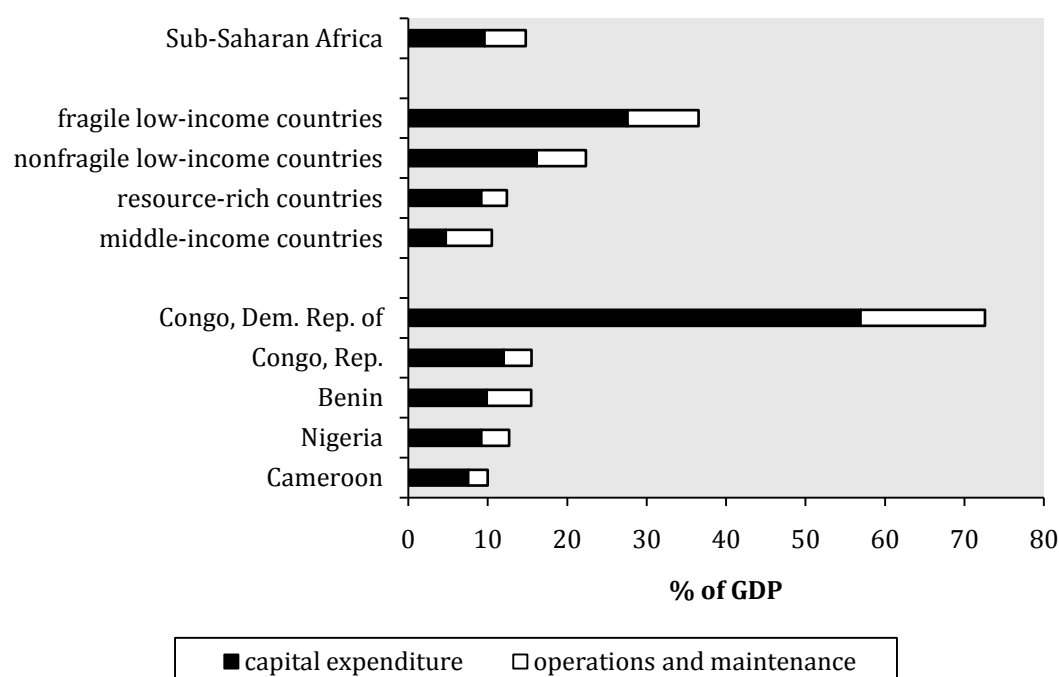
The Republic of Congo's spending needs are equivalent 16 percent of GDP. While high, that figure is similar to what the continent as a whole faces (15 percent of GDP) and slightly greater than in the resource-rich peer group (12 percent of GDP) (figure 10).

Existing infrastructure spending in the Republic of Congo amounts to \$463 million per year. The public sector accounts for 82 percent (\$381 million) of that total, while non-OECD financiers² account for 10 percent (\$44 million), and official development assistance (ODA) and the private sector account for

² Non OECD financiers include China, India, and the Gulf states. For more information, please visit <http://www.ppiaf.org/documents/ebook-BuildingBridges.pdf>

about 4 percent each. Operating expenditure is fully funded by the public sector through either budgetary resources or user payments. The transport and energy sector together account for approximately 80 percent of total annual flows to infrastructure sectors. The public sector accounted for 71 percent of capital spending. Non-OECD financiers—predominantly China—are becoming an increasingly important source of infrastructure financing and contribute 16 percent of total capital expenditure. As is to be expected given the Republic of Congo's resource-rich condition, ODA is a relatively small component of capital expenditure—only 7 percent. Finally, the private sector accounts for 6 percent of total capital expenditure, predominantly in ICT. Overall, capital expenditure absorbs 60 percent of total infrastructure spending (table 9).

Figure 10. Spending needs in Congo are high, but similar to other African countries



Source: Briceño-Garmendia and others 2008.

The country's infrastructure spending is already quite substantial relative to the size of economy—8 percent of GDP, which is higher than the average for resource-rich countries and African peers (figure 11). That level of spending falls short of the 15 percent of GDP that China has invested in infrastructure over the last two decades, but it nevertheless represents a significant effort and commitment to developing infrastructure in a country that is emerging from the devastation of conflict.

The Republic of Congo's investment patterns differ significantly from its resource-rich peers, which is likely a result of the underlying sources of infrastructure financing. The country invests considerably more in transport infrastructure than African peers, about the same in power, and substantially less in ICT, water, and sanitation. The absence of PPI financing in power and transport is notable when compared with African peers. Similarly, ODA support to the water and sanitation sector is practically nonexistent, which is not typical of other countries of the region. The country relies heavily on public

finance and some non-OECD finance for transport and power, whereas external financiers play a much more prominent role in the other resource-rich countries (figure 12).

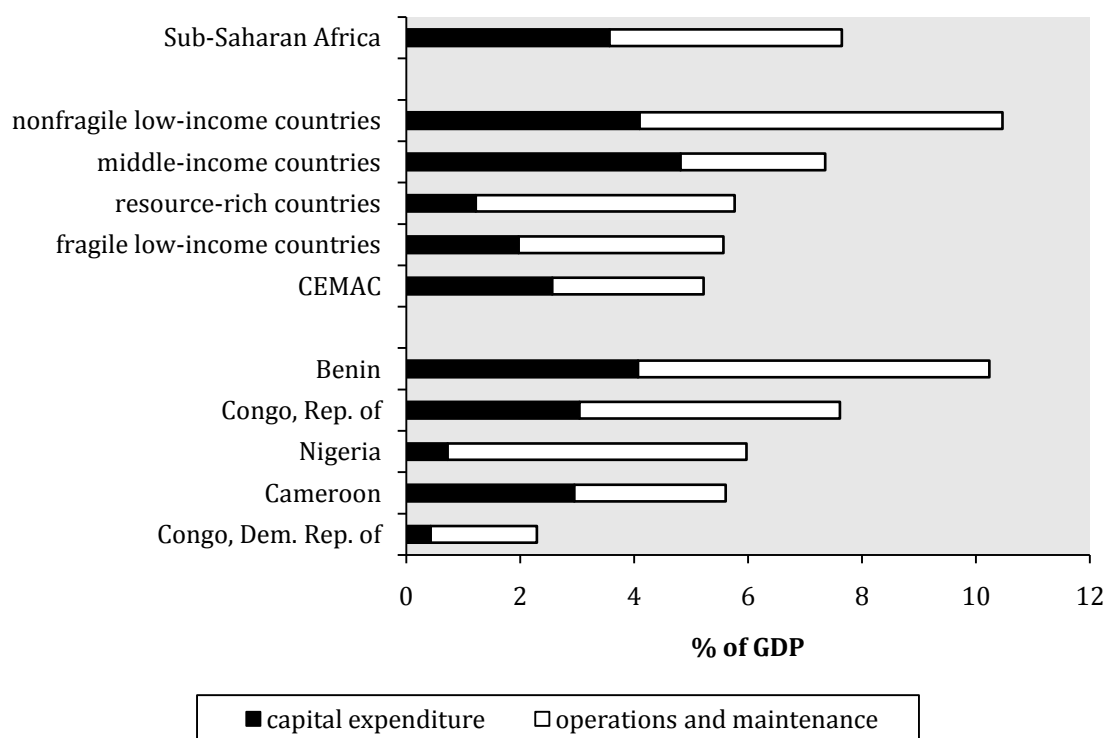
Table 9. Annualized spending on infrastructure in Congo from all sources (yearly average 2004–07)

Sector	US\$ million per year						Total
	O&M		Capital expenditure				
	Public sector	Public sector	ODA	Non-OECD financiers	PPI	Capital exp. total	
ICT	6	6	0	0	18	24	30
Power	62	32	2	31	0	65	128
Transport	89	139	17	12	0	168	258
WSS	28	19	0	1	0	20	48
Total	185	196	19	44	18	278	463

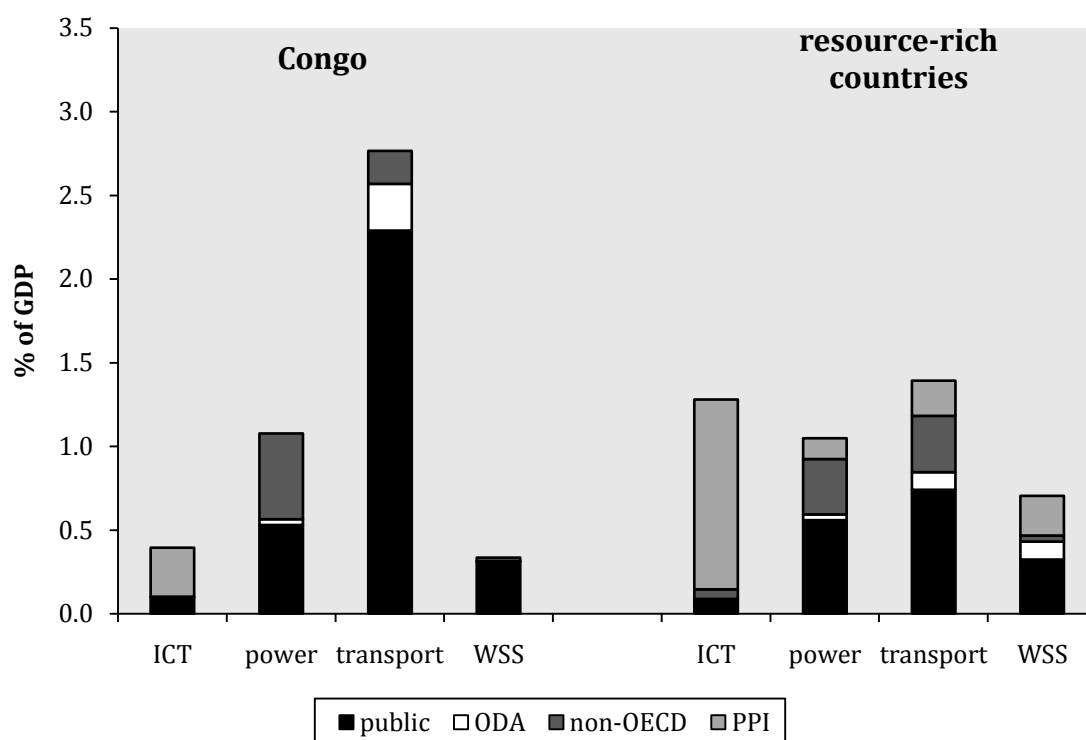
Source: Briceño-Garmendia and others, 2008. Note: Public sector includes budget and off-budget funding.

ODA = official development assistance from OECD member countries; PPI = private participation in infrastructure.

Figure 11. Public funding for infrastructure is high in Congo



Source: Briceño-Garmendia and others 2008.

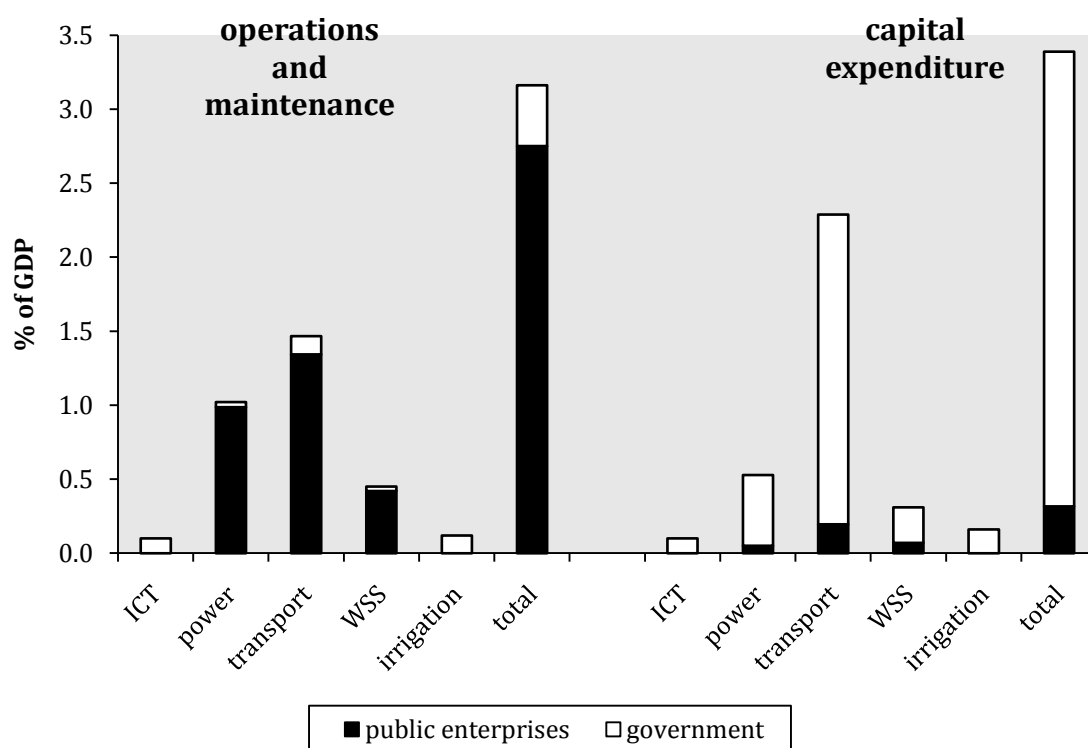
Figure 12. Main sources of capital investment in infrastructure in Congo

Source: Briceño-Garmendia and others 2008.

Public investments are channeled almost entirely through the central government. Neither power nor water utilities report significant investments financed from own sources. Operating expenditure, on the other hand, is channeled almost entirely through state-owned enterprises (figure 13).

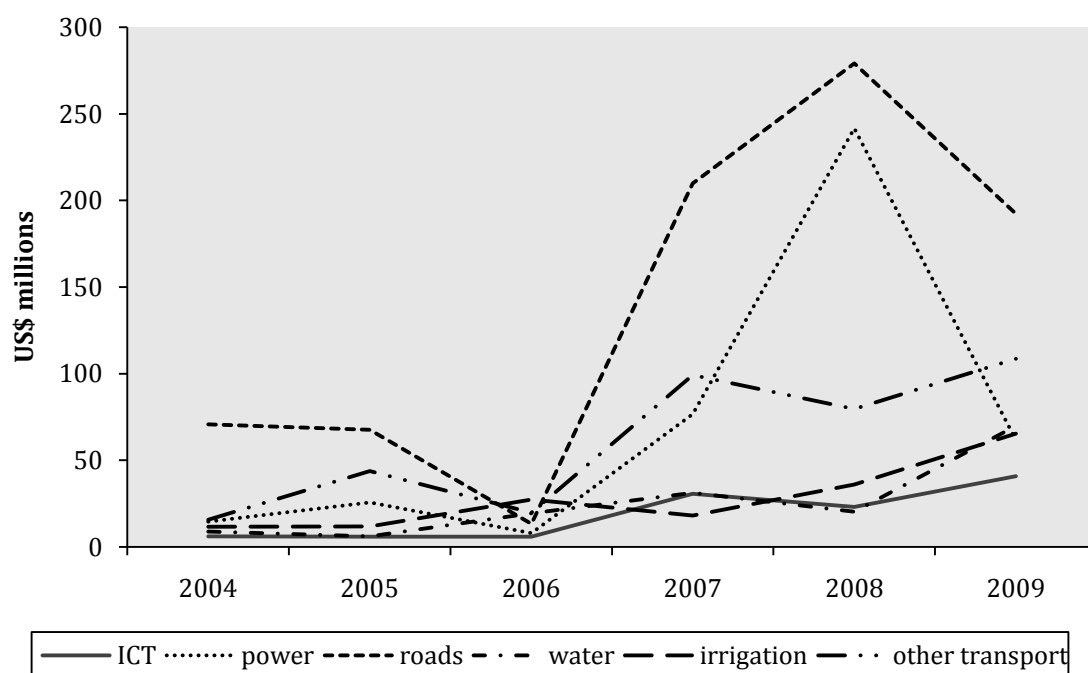
In recent years, on-budget public spending has increased substantially, most notably in investment in roads transport. After a sharp drop in 2006, budgetary spending on roads and power rose to unprecedented levels in 2008 (figure 14). The absolute value of road spending averaged \$35 per capita per year, which is high compared with other Central African countries. The investment program consists mainly of rehabilitation, upgrading, and widening of the trunk network. However, budget estimates for 2009 were significantly lower than 2008 spending, which casts doubt on whether such a high level of public spending is sustainable.

Figure 13. Responsibility for capital investment and O&M in Congo, by sector



Source: Briceño-Garmendia and others 2008.

Figure 14. Budgetary spending on infrastructure, 2004–06



Source: Republic of Congo budget book.

Note: 2004–08 data are actual, 2009 data is budgeted.

A similar increase was observed in funding for road maintenance and rehabilitation. Resources allocated for road maintenance and rehabilitation through the road fund doubled between 2005 and 2007 and grew an additional 50 percent in 2008, when they reached \$54 million (table 10). Although this would be enough to cover maintenance costs of the existing network, approximately half of road fund's resources have been allocated for rehabilitation. To remedy this situation, the road fund should have a clear mandate to provide resources only for maintenance, and rehabilitation should be financed out of the investment budget.

Table 10. Existing resource flows to the road sector, US\$ million per year

Year	Roads				Other transport		
	Capital exp.	O&M central gov't	O&M road fund*	Total	Capital exp.	O&M central gov't	Total
2004	68	2	0	71	14	2	16
2005	67	1	16	84	42	2	44
2006	12	1	26	39	7	13	20
2007	208	1	35	245	91	8	99
Average, 2004–07	89	1	26	110	39	6	45
2008	276	3	54	333	73	7	80

* 50 percent of road fund resources are used for rehabilitation.

An estimated \$322 million of additional resources could be recovered each year by making more efficient use of the country's existing resource envelope. Efficiency gains (improved capital budget execution, cost recovery, and operational efficiency) would account for \$209 million of that total, and another \$112 million could be gained by reallocating resources to better uses.

Reducing operating inefficiencies could reduce hidden costs by \$79 million per year (or 1.3 percent of GDP). Distribution losses (particularly in the power sector) account for \$51 million of that total, while the costs of overstaffing (primarily in the state-owned incumbent power utility) are \$20 million per year. Finally, eliminating undercollection in the country's power and water utilities could save an additional \$8 million a year (table 11).

Table 11. Potential gains from greater operational efficiency

Sector	US\$ million per year				
	ICT	Power	Transport	WSS	Total
Overemployment	--	17	--	3	20
Losses	--	49	--	2	51
Undercollection	--	7	0	1	8
Undermaintenance	--	--	0	--	0
Total	--	73	0	6	79

Source: Briceño-Garmendia and others 2008.

-- = data not available.

Infrastructure services are underpriced in the Republic of Congo, particularly in the power and water sectors. If tariffs were raised to cost recovery levels, a further \$78 million could be recovered (table 12).

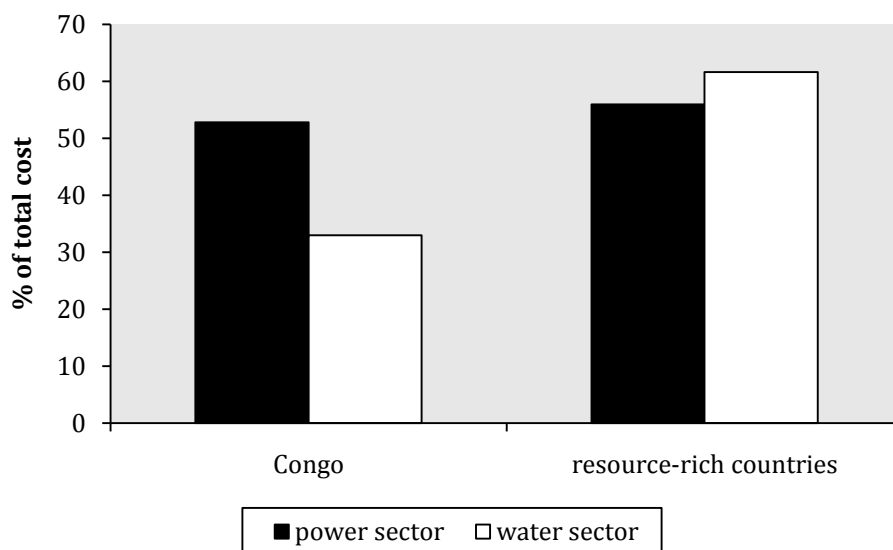
When all operating and capital costs are taken into account, the average historical cost of producing electricity in the Republic of Congo has been \$0.28 per kilowatt hour. By comparison, the average effective power tariff in the country has been \$0.15 per kilowatt hour, which covers only 53 percent of costs. This is similar to other utilities in resource-rich countries. In the water sector, the average total cost of producing utility water is an estimated \$0.80 per cubic meter, while the average effective tariff is only \$0.26, which broadly covers operating and maintenance costs. As a result, the main utilities in the sector cover only 33 percent of their costs—significantly worse than other resource-rich countries (figure 15).

Table 12. Potential gains from increased cost recovery

Sector	US\$ million per year	Percentage of GDP
ICT	—	—
Power	56	0.92
Transport	5	0.08
Water	17	0.28
Total	78	1.28

Source: Briceño-Garmendia and others 2008. — = data not available.

Figure 15. Power and water sectors: cost recovery

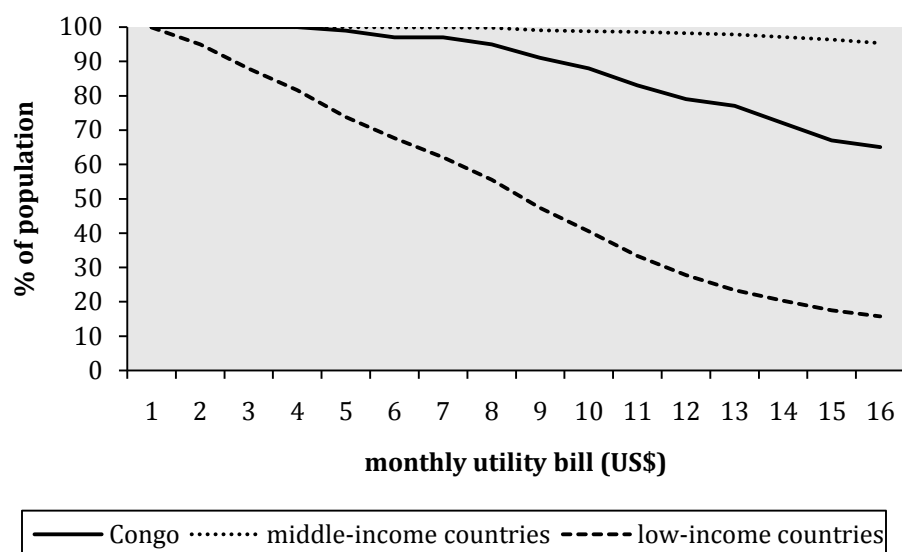


Source: Briceño-Garmendia and others 2008.

Underpricing of utility services such as power and water is often justified by affordability concerns, but cost recovery tariffs for power and water would be affordable to the vast majority of the population. To determine the affordability of cost recovery tariffs in the Republic of Congo, it is assumed that a household can afford to spend 5 percent of its budget on utility bills. With cost recovery tariffs for water estimated at \$0.80 per cubic meter, a monthly water bill would cost between \$3.20 and \$8.00, depending on whether 4 or 10 cubic meters is taken as the subsistence monthly consumption. Tariffs at this level would be affordable for between 95 and 100 percent of the population. In the power sector, cost recovery tariffs are estimated at \$0.28 per kilowatt-hour. A monthly power bill would therefore cost between \$7.00 and \$14.00, depending on whether 25 or 50 kilowatt hours is taken as the subsistence monthly

consumption. Tariffs at this level would be affordable for between 70 and 95 percent of the population (figure 16).

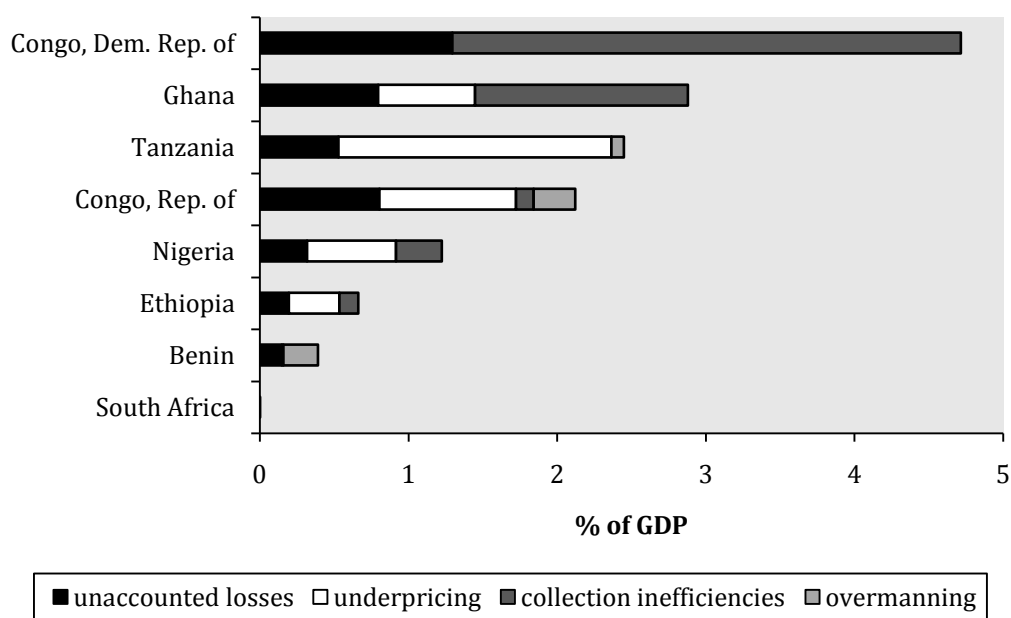
Figure 16. Affordability of cost recovery tariffs



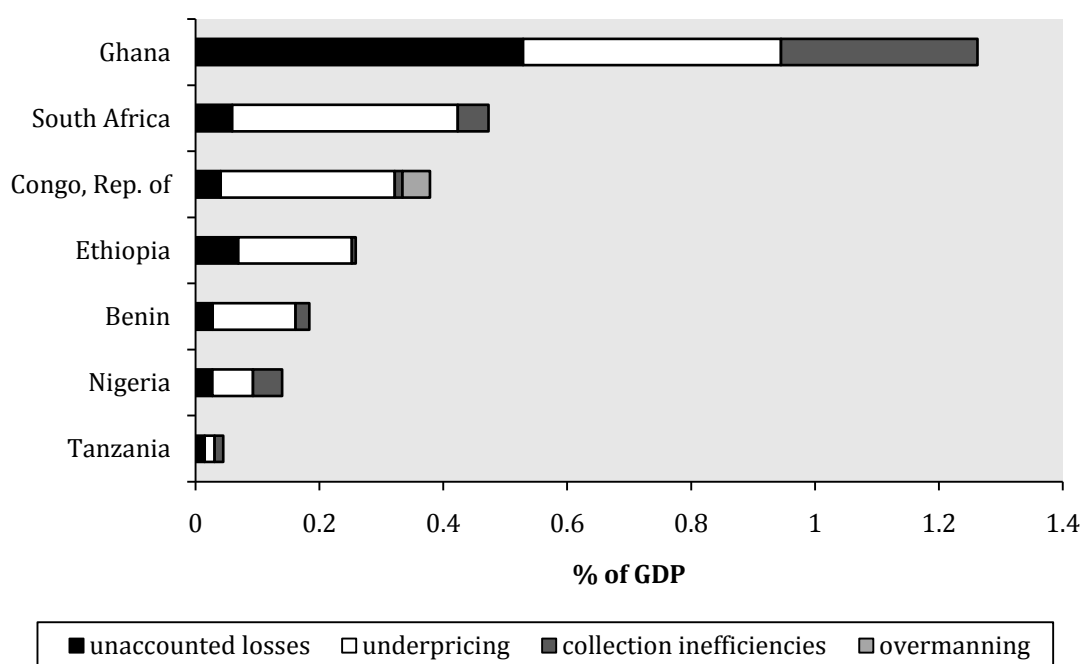
Overall, inefficiencies in the power sector create hidden costs equivalent to slightly more than 2 percent of GDP, which is on the higher end for utilities in other resource-rich countries (figure 16). In the water sector, inefficiencies create hidden costs of around 0.3 percent of GDP, which is on par with other water utilities in resource-rich countries (figure 16).

Figure 16. Hidden costs of power and water sector inefficiency

a. Power



b. Water supply



Source: Briceño-Garmendia and others 2008.

Low capital budget execution in the infrastructure sectors results in losses of around \$52 million per year. From 2004 to 2007, the government allocated every year on average \$157 million, or about 3 percent of GDP, to support infrastructure service delivery in the four sectors. However, on average only 67 percent of budget allocations were executed. The capital budget execution ratio has been particularly low for power (41 percent of budget allocations). Improving budget execution efficiencies could therefore make a further \$52 million available for infrastructure spending each year.

By reallocating resources within and across sectors, Congo could gain US\$ 38 million and US\$ 74 million, respectively, toward funding its infrastructure needs (table 14).³ First, the country spends much more on maintenance than it will need to once its road infrastructure and hydropower portfolio are further developed. In the power sector, about \$18 million per year could be reallocated from operations and maintenance to capital investment. A further \$20 million per year could be reallocated toward capital spending within the transport sector. Second, the country's large road investment program is an effort to catch up with a backlog of underinvestment in rehabilitating and extending the road network. In the long run, this level of spending goes beyond what will be needed, and \$74 million could be reallocated from the transport sector to other sectors with greater spending needs. In total, approximately \$112 million in spending could be recovered each year by reallocating it within and across infrastructure sectors (table 14).

³ This refers to spending beyond the capital or operational spending needs estimated for achieving infrastructure development targets. In this context, total spending resources could be split in three categories, including spending traced to support needs, spending with potential for reallocation within sectors, and spending with potential for reallocation across sectors. The potential reallocation within sectors corresponds to spending that can be reallocated to a better economic use, for example from operations and maintenance to capital investment. The potential reallocation across sectors corresponds to spending that can produce higher economic returns if allocated to those sectors with the greatest needs.

Table 14. Funding gaps, by sector, based on 2004–07 levels of public spending

US\$ millions per year	ICT	Power	Transport	WSS	Cross sector	Total**
Needs	(84)	(482)	(163)	(216)		(946)
Spending traced to needs*	30	109	163	48		351
Potential for reallocation within sector (opex-capex)	0	18	20	0		38
Potential efficiency gains	0	146	40	23		209
Potential for reallocation across sectors					74	
(Gap) or surplus	(54)	(208)	60	(145)	74	(274)

* yearly averages for 2002–07 based on data available; ** totals calculated assuming that no limitations on reallocations across sectors.

Infrastructure spending directed to needs in the Republic of Congo is already \$351 million per year—close to 40 percent of the estimated infrastructure deficit. If operational efficiencies were eliminated, an additional \$209 million per year could be recovered. Finally, \$112 million per year of existing spending could be reallocated within and across sectors towards uses and sectors with a greater need. After accounting for all of these resources, the Republic of Congo still faces an annual infrastructure funding gap of \$274 million—about 4.7 percent of GDP—over the next decade. Over 60 percent of the infrastructure funding gap can be traced to the power sector, in which the shortfall is \$208 million. Much of that total is associated with the development of the additional generating capacity that the country would need to meet its power demand. There is also a significant funding gap in water and sanitation, where meeting the MDG targets creates a funding gap of \$145 million per year until 2015. The rest of the gap relates to ICT, where an additional \$54 million would be needed. No financing gap was found for transport (see table 14).

If the country were able to sustain for infrastructure at 2008–09 levels, the infrastructure funding gap would disappear (table 15). Deficits would remain in all sectors, but there would be significant potential for reallocation of resources across sectors that could eliminate any funding gaps. This assumes, however, that all potential efficiency gains are realized, which would realistically take several years to achieve, and that there are no limitations on reallocations.

Table 15. Funding gaps, by sector using 2008–09 levels of public spending

US\$ millions per year	ICT	Power	Transport	WSS	Cross sector	Total**
Needs	(84)	(482)	(163)	(216)		(946)
Spending traced to needs*	50	225	163	76		514
Potential for reallocation within sector (opex-capex)	0	23	22	0		45
Potential efficiency gains	0	214	94	23		332
Potential for reallocation across sectors					271	217
(Gap) or surplus	(34)	(20)	116	(117)	271	216

* yearly averages for 2008–09 based on data available; ** totals calculated assuming no limitations on reallocations across sectors.

The infrastructure funding gap could also be significantly reduced by choosing alternative technologies to meet targets. In the case of water and sanitation, the cost of meeting the Millennium Development Goals could be substantially reduced from \$216 million to \$115 million per year—an

annual savings of \$101 million—by using lower cost technologies, such as stand posts, boreholes and improved latrines for all service expansion, instead of maintaining the existing mix of higher end solutions. Similarly, the cost of meeting connectivity targets in the transport sector could be reduced from \$163 million to \$106 million per year—an annual savings of \$57 million—by using lower cost technologies such as single surface treatment in place of asphalt.

Without regional power trade, the funding gap would be substantially higher. In the case of power, the cost estimates presented here are based on the assumption that regional power trade will develop fully within the Central African Power Pool. This would allow the Republic of Congo to import around 4 terawatt hours of cheaper power from Cameroon. Without these imports, the costs of meeting power demand based using domestic resources would increase from \$482 million to \$754 million a year, which would increase the infrastructure funding gap by \$272 million.

If infrastructure spending does not remain at 2008-09 levels, then an infrastructure funding gap will remain, even if all efficiency gains are realized. In that case, the Republic of Congo will need to find additional resources to meet the funding gap. Finding resources from outside the budget could bring additional benefits beyond financing. For example, cross-border financing mechanisms, such as for power generation and transmission investments, as well as joint transport projects like the Kinshasa–Brazzaville rail and road bridge, would help develop regional infrastructure corridors. Furthermore, attracting private sector investment into the country's infrastructure sectors could provide critical technical and managerial know-how on infrastructure development and service delivery. As noted in a recent investment climate assessment (World Bank 2009), stronger private sector involvement in the economy will require reforms to the legal and regulatory framework.

Unless the Republic of Congo takes some of the policy measures described above, meeting the country's infrastructure targets will be delayed significantly. If the country is unable to sustain spending at 2008-09 levels, capture efficiency gains, or reduce costs through suitable technology choices, and instead continues to spend at the levels of the mid-2000s, the country will take 78 years to achieve its infrastructure targets, far longer than the decade assumed at the outset. By capturing efficiency gains and maintaining spending at the level of the mid-2000s, the country could meet the infrastructure targets within 31 years. While this is still a significant delay, it illustrates because the importance of eliminating inefficiencies; in other words, capturing the efficiency gains could bring the country's infrastructure agenda forward almost 50 years.

Finally, tackling the issues of governance, prioritization, and poor absorption capacity is of paramount importance if infrastructure is to fully contribute to economic diversification and growth. The country's identified investment agenda—for power and transport alone—amounts to more than 30 percent of the country's GDP. The circumstantial increase in the oil price has provided a unique opportunity for financing some of these projects, but the oil windfall will be limited in time and scope. There is a pressing need for selective investment that will diversify the economy. However, the capacity of the public sector to increase spending in an efficient manner is very limited and would require not only better planning but also better project selection, design, and capacity for project management. One-third of the capital budget for infrastructure goes unspent, so even if projects are planned and resources are available to afford investments, the capacity to deliver is limited. From the supply side, the capacity of the private sector to respond to the increased demand stimulated by public spending has proven to be limited, and shortages of

human and physical capital have limited increases in asset creation and produced a disproportionate increase in prices in construction-related activities and inputs. An analysis of the evolution of concrete prices in Brazzaville and Pointe Noire provides evidence of this. From 2006 on, prices of concrete doubled in both cities. From the macroeconomic perspective, the sudden increase in public spending creates conditions for an appreciation of the exchange rate that could seriously undermine the competitiveness of the country in international markets, if not compensated by policies and investments that raise productivity and improve supply capacity.

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This country report draws upon a wide range of papers, databases, models, and maps that were created as part of the Africa Infrastructure Country Diagnostic. All of these can be downloaded from the project website: www.infrastructureafrica.org. For papers go to the document page (<http://www.infrastructureafrica.org/aicd/documents>), for databases to the data page (<http://www.infrastructureafrica.org/aicd/tools/data>), for models go to the models page (<http://www.infrastructureafrica.org/aicd/tools/models>) and for maps to the map page (<http://www.infrastructureafrica.org/aicd/tools/maps>). The references for the papers that were used to compile this country report are provided in the table below.

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About AICD and its country reports

This study is a product of the Africa Infrastructure Country Diagnostic (AICD), a project designed to expand the world's knowledge of physical infrastructure in Africa. AICD provides a baseline against which future improvements in infrastructure services can be measured, making it possible to monitor the results achieved from donor support. It also offers a solid empirical foundation for prioritizing investments and designing policy reforms in Africa's infrastructure sectors.

The AICD is based on an unprecedented effort to collect detailed economic and technical data on African infrastructure. The project has produced a series of original reports on public expenditure, spending needs, and sector performance in each of the main infrastructure sectors, including energy, information and communication technologies, irrigation, transport, and water and sanitation. *Africa's Infrastructure—A Time for Transformation*, published by the World Bank and the Agence Française de Développement in November 2009, synthesized the most significant findings of those reports.

The focus of the AICD country reports is on benchmarking sector performance and quantifying the main financing and efficiency gaps at the country level. These reports are particularly relevant to national policy makers and development partners working on specific countries.

The AICD was commissioned by the Infrastructure Consortium for Africa following the 2005 G8 (Group of Eight) summit at Gleneagles, Scotland, which flagged the importance of scaling up donor finance for infrastructure in support of Africa's development.

The AICD's first phase focused on 24 countries that together account for 85 percent of the gross domestic product, population, and infrastructure aid flows of Sub-Saharan Africa. The countries are: Benin, Burkina Faso, Cape Verde, Cameroon, Chad, Côte d'Ivoire, the Democratic Republic of Congo, Ethiopia, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Tanzania, Uganda, and Zambia. Under a second phase of the project, coverage was expanded to include as many of the remaining African countries as possible.

Consistent with the genesis of the project, the main focus is on the 48 countries south of the Sahara that face the most severe infrastructure challenges. Some components of the study also cover North African countries so as to provide a broader point of reference. Unless otherwise stated, therefore, the term "Africa" is used throughout this report as a shorthand for "Sub-Saharan Africa."

The World Bank has implemented the AICD with the guidance of a steering committee that represents the African Union, the New Partnership for Africa's Development (NEPAD), Africa's regional economic communities, the African Development Bank (AfDB), the Development Bank of Southern Africa (DBSA), and major infrastructure donors.

Financing for the AICD is provided by a multidonor trust fund to which the main contributors are the United Kingdom's Department for International Development (DFID), the Public Private Infrastructure Advisory Facility (PPIAF), Agence Française de Développement (AFD), the European Commission, and Germany's Entwicklungsbank (KfW). A group of distinguished peer reviewers from policy-making and academic circles in Africa and beyond reviewed all of the major outputs of the study to ensure the technical quality of the work. The Sub-Saharan Africa Transport Policy Program and the Water and Sanitation Program provided technical support on data collection and analysis pertaining to their respective sectors.

The data underlying the AICD's reports, as well as the reports themselves, are available to the public through an interactive Web site, www.infrastructureafrica.org, that allows users to download customized data reports and perform various simulations. Many AICD outputs will appear in the World Bank's Policy Research Working Papers series. Inquiries concerning the availability of data sets should be directed to the volume editors at the World Bank in Washington, DC.

